The Garden Journal

of The New York Botanical Garden

Vol. 2, No. 5 Sept.-Oct., 1952

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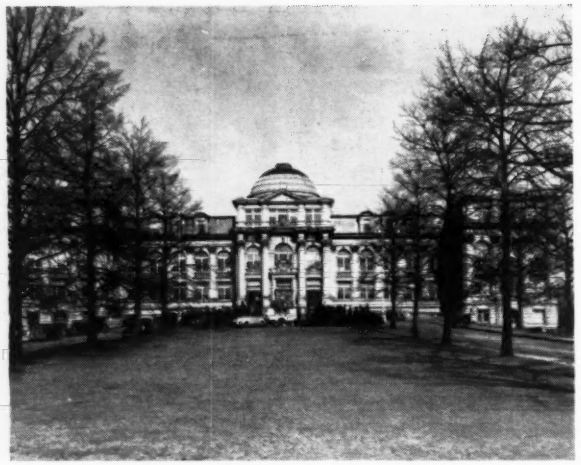

October 24, 25, 26, 1952 — Eighth Annual Chrysanthemum Show and Program at The New York Botanical Garden, with the cooperation of the Northern New Jersey, Westchester County and Long Island Chapters of the National Chrysanthemum Society.

November 7-23, inclusive — "By an Old Millstream," the Chrysanthemum Show in the Conservatory of The New York Botanical Garden.

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THE GARDEN JOURNAL
of The New York Botanical Garden

THE CONTENTS
September-October 1952

A New Look at the Food Problem — *H. A. Spoehr* — 133
A Little-Known Species of Cyclamen — *Walter C. Blasdale* — 135
Chrysanthemum Arrangements — 137
Chrysanthemums for Show — *Charles L. Tyrrell* — 138
Plants For Scandinavia — *Sven Ahman* — 139
How Will You Rock Garden? — *Dorothy Ebel Hansell* — 142
The Oldest Fruit Industry — The Fig — *Ruth V. Caviston* — 144
A Lesson in Transplanting — *Edwin Beckett* — 146
The Washington Arboretum — *Brian O. Mulligan* — 147
Rose Varieties — Part II — *Edwin De T. Bechtel* — 151
The Late T. A. Havemeyer — Lilac Fancier — *John C. Wister* — 154
Square Meals from Round Berries — *Margaret McKenny* — 157
Book Reviews — 158
Zonal Geraniums — 162
News, Notes and Comments — 163
From the Herb Shelf — *Elizabeth Remsen Van Brunt and Mary Whitman* — 164
The Question Box — 164

AMONG OUR CONTRIBUTORS

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CREDIT FOR ILLUSTRATIONS

Front cover, colored illustration of the Chrysanthemum Show in the Conservatory of The New York Botanical Garden, November 1951, by Earle Dugan; pp. 135, 136, Dr. Walter C. Blasdale; pp. 137, 138, Adrien Boutrelle; p. 140, "American Swedish Monthly; p. 142, Gottscho-Schleisner; p. 143, top, Kurt C. Baasch, bottom, Gottscho-Schleisner; p. 145, California Fig Institute Research Laboratories, Fresno, California; pp. 147, 148, 149, E. F. Marten — courtesy of Washington Campus Studios; pp. 153, 155, 157, drawings by Walter L. Graham; back cover, the Bronx River flowing through The New York Botanical Garden, by E. N. Mitchell.

The Garden Journal of The New York Botanical Garden is published bimonthly by The New York Botanical Garden, Bronx Park, New York 58, N. Y. Printed in U. S. A. Re-entered as Second Class Matter, February 1, 1951, at the Post Office at New York, N. Y., under the Act of August 24, 1912. Annual subscription, $2.00. Single copies 35 cents. Foreign countries and anywhere outside the continental United States, 50 cents a year extra.

A NEW LOOK *at the FOOD PROBLEM*

By **H. A. Spoehr**

THE United States has been the most favored of nations in having an abundant supply of food. As a nation we have never known real hunger, and we have shared our abundance liberally with those less favored. But the numbers of the hungry the world over are growing faster than are the supplies of food. It is becoming a grim race between the ever-increasing hordes of hungry people and the scientific and technological exertions to increase the world's food supply. The peace of the world largely depends upon the outcome of this race.

Only those who have sufficient can afford to risk a portion of this abundance in order to find means of improving the lot of the many. Scientific research is a venture; the larger the the problem, the greater is the risk. Like all exploration, scientific research demands adequate backing, and this can come only from those who have. So far as the world's food problem is concerned it is everyone's problem for, in one way or another, sooner or later, it will affect every human being.

In simplest terms, food production the world over is dependent upon the photosynthetic capacity of a land area. This is the ability of plants growing on that land area to produce organic matter through the absorption of the sun's energy. In the past, increased food production has been attained primarily through the extension of the land areas which have been put under cultivation. This extension of cultivated land areas has been made possible through the use of machinery in place of man's muscle, and by the scientific application of fertilizers, the development of adapted genetic strains, and through the control of diseases and pests. Fortunately, there is prospect that some further developments in all of these directions may yield further increases in world food production. But at best, these further developments are not in step with the increase of world population. It is, moreover, important to bear in mind that in all of these possible developments the fundamental process, that of trapping the energy of the sun through photosynthesis, remains the primal source of all food.

For the moment we can look at one aspect of the problem in the simplest terms, namely the utilization of solar energy by the plant. The earth receives a prodigious amount of radiant energy from the sun; about 20,000,000 kilocalories strike an acre of land each day, or a total of 7,300,000,000 kilocalories per year on each acre of land. Potentially, this may be considered as fabulous wealth. But as yet we have been able to realize very little on this abundance, for in the form in which it is received we can't transport it, we have difficulty in storing it; directly it provides neither food, shelter, nor clothing. Only through the intermediary of the green plant, that is, through the process of photosynthesis, is this wealth transformed into forms of use for food, shelter, and clothing. But the amount of energy which is thus transformed is very small; only about one tenth to five tenths per cent of the sun's radiation falling on an acre of land per year is fixed as organic material in the temperate zone. Of this amount, only about one-half is in the form of consumable food.

There are a number of factors which are responsible for this astonishingly low return. In the temperate zone plants can grow during only about four months of the year. During much of this growing season the plants are small and, consequently, can utilize only a fraction of the energy falling on the area of land they occupy. Many plants, such as wheat, oats, and barley, after the seeds are planted in the soil, require a long time of growth before sufficient leaf surface has developed to form anything like a complete coverage of the land for absorbing the maximum quantity of sunlight. Consequently, for only two or three weeks is the plant manufacturing organic material at its maximum capacity. Another circumstance which makes for low efficiency in the utilization of solar energy by the plant is the fact that about one-half of the total solar radiation is composed of heat rays and infrared radiation. These wavelengths are not effective in photosynthesis. Consequently, the plant is capable of utilizing for the synthetic process only about one-half of the radiation incident on it.

The visible light of the sun is the force which drives the photosynthetic mechanism of the plant. But besides a source of energy, this synthesizing mechanism must be provided with an adequate supply of raw materials. These are primarily water and carbon dioxide. The necessity of water for the development of plants is, of course, a matter of common knowledge. That carbon dioxide is indispensable is less obvious. Yet it is from this raw material that all the organic material produced by the plant is derived. The plant draws the carbon dioxide from the atmosphere. Air contains normally only three hundredths per cent of carbon dioxide, and on this thin thread of

supply hangs our very existence. If the percentage of carbon dioxide in the air is doubled, the rate of photosynthesis is also doubled. It has long been known that the production of crops can be materially increased through enrichment of the air with carbon dioxide. Such enrichment has, however, been found impracticable in the conventional agricultural methods.

In view of the dire need for food by the older, more densely populated civilizations, such as exist throughout the Orient, the idea has arisen of examining critically the fundamental scientific concepts underlying the means now in use. Obviously, reliance can not be placed on a continuous increase in the areas of land to be cultivated. Besides making more efficient use of the areas now under cultivation, can not man's ingenuity devise other fundamental improvements? In no important endeavor is man so strongly bound to the past as he is in the matter of production of his food. In housing, in means of transportation and communication, and in defense against his enemies, he has quite broken with the past and has made truly fundamental advances. But basically, agriculture is still bound to the past. The plants which serve us as sources of food today were brought into cultivation by primitive men. These plants have been brought to yield more and better quality of food through a series of purely empirical and scientific methods. Thereby, on the whole, increased yields of some forty per cent have been attained; these have, indeed, been invaluable contributions. But it seems doubtful whether further developments in this direction can be expected to improve yields so that they even approximate the estimated increase in the demand for food. Are there not other means of utilizing the remarkable synthesizing capacity of plants?

We rely for our food sources upon an astonishingly small portion of the plant kingdom and these are mostly higher, seed plants. Moreover, of the plants thus used only a fraction, rarely more than fifty per cent, is used for human consumption, mainly in the form of seeds, tubers, and storage organs. Much of the organic material of which these higher plants are composed is cellulose and derivative material, which has little or no nutritive value for man. The very structure of these plants seems ill-adapted to the purpose of human food production. The primary manufactory of organic material is in the green leaves. It is here that the synthesizing processes occur that utilize solar energy. From the leaves the organic materials migrate to other parts of the plant, often over a considerable distance. Much of the material which the leaves manufacture is used in the construction of the transportation system, of the roots and stem, and finally a portion is laid down in seeds or tubers as storage material.

A quite different relationship between manufacture of organic material and its storage exists in some of the lower forms of plant life, such as the unicellular green algae. These plants are relatively highly efficient photosynthesizers. Each cell contains an ample amount of the pigments essential to photosynthesis. The organic material formed in the process is stored within each cell. The growth of the plant takes place primarily through the division of each cell into four, eight, or sixteen new cells, each of which is capable of photosynthesis and of further division about every twelve hours under favorable conditions. Thus, the photosynthetic machine consists of a huge number of minute, photosynthetically active cells, the entire population freely suspended in water. For the growth of the population, there are required only simple inorganic salts dissolved in water, carbon dioxide from which to manufacture the organic material, light to drive the photosynthetic process, and a temperature between 65° and 80°. The organic material synthesized consists mainly of proteins, carbohydrates, and fats.

Plants of this category have, furthermore, another remarkable attribute which may prove to be of consequence in considering them as a source of food. Their composition in regard to the relative amounts of carbohydrates, proteins, and fats can be altered at will. By careful control of the composition of the mineral nutrient solutions in which they grow, of the light intensity, and the age of the culture, a wide variation in the relative amounts of the important constituents can be attained. Thus it has been possible to grow at will plants containing fifty per cent of protein or ten per cent protein, and to vary the fat produced from five per cent to eighty-five per cent. Such flexibility does not exist in higher plants, because their very structure demands that a relatively large proportion of the plant be composed of cellulose.

There is, of course, a wide variety of unicellular green algae which might come under consideration for these purposes and are deserving of study. For the investigation of large-scale culture, attention has been given primarily to chlorella. The requisites for the growth of such an organism are essentially the same as those of any usual crop plant. In the case of algal culture, some of these requisites can be more exactly controlled than is the case with plants growing in the field. In the former the plant grows suspended in water and this must, of course, be retained in vessels or chambers of some sort. There are consequently only small losses of water. The essential mineral nutrients are much the same as the usual fertilizers, viz., salts of fixed nitrogen compounds, of potassium, phosphates, magnesium sulphate, and the so-called trace elements. The source of carbon is also carbon dioxide and this gas is supplied in a mixture of five per cent in air. Air thus enriched greatly increases the rate of photosynthesis, though concentrations above five per cent are not advisable. The driving force of the process is, of course, light, and the most effective use of sunlight constitutes one of the most important problems of the entire undertaking. Experience thus far obtained emphasizes the necessity of preventing the contamination of the cultures with other organisms. The chlorella cells are good food and are consequently subject to "spoilage" by bacteria and molds.

As has already been mentioned, the conventional methods of agriculture make very inefficient use of the all-important sunlight, because during a large part of the growing season only a fraction of the land area is covered by light-absorbing vegetation. As the plants grow, this area increases, but maximal absorption of sunlight is attained for only a very short time; then the crop matures and is harvested.

(Continued on page 153)

A Little-Known Species of Cyclamen

By Walter C. Blasdale

Mature flowers and leaves of *Cyclamen hederifolium*, showing their distinctive features.

I THINK it is correct to state that, at least in the United States, there are but few owners of the house plant so largely sold by florists under the name of cyclamen, who are aware of the fact that this name represents a genus of seventeen species and subspecies. The many unusual features of its leaves and flowers are outstanding, and owners of plants of any one of the species would at once recognize plants of any of the others, even though they have had but little training in the lore of the plant world. Still another bit of information which may arouse surprise is the fact that modern botanists agree in putting the genus *Cyclamen* in the family Primulaceae, which includes the primrose, cowslip, loosestrife, and pimpernel.

The species of *Cyclamen* grow naturally in the regions surrounding or not far from the shores of the Mediterranean and Black seas. The one sold by florists, although sometimes called Persian cyclamen and known to botanists as *Cyclamen persicum,* is not a native of Persia. It is found in Palestine and certain parts of Asia Minor and Tunisia. At least a dozen of the species are in cultivation in England, and many of them have been found to be excellent plants for the open border, rock garden, alpine house, or conservatory. Several of these are gradually being added to the list of ornamentals grown in the United States, especially in the Pacific Northwest. Here, in California, I have grown the species *africanum, coum, cilicicum, europaeum, hederifolium* (also known as *repandum), libanoticum, persicum, vernum* (also known as *ibericum)*. Seeds of many of these can be purchased from English firms, and a few of the nurseries of the United States supply corms.

Cyclamen hederifolium Aiton: the specific name used for this species means ivy-leaved, but it must be conceded that its leaves, as shown in the accompanying photograph, are but poor imitations of those of the English ivy as to their form, and they are even poorer imitations as to their structure and substance. Like most of the European species of the genus, this one was discovered fairly early and, largely because of the inadequacy of the descriptions used to define the species at that time, it became associated with several specific names, including *hederifolium* (1789), *vernum* (1798), *repandum* (1806), and *romanum* (1844). It was not until 1939 that Schwarz, in his monograph of the genus, showed that Aiton's name *hederifolium* antedates the name *repandum* by seventeen years, although the latter had been in common use for many of the preceding years by both botanists and horticulturists.

C. hederifolium is usually found in shaded situations where there is an abundance of moisture during the winter and spring and where the soil contains a fair proportion of humus. It is quite common in central and southern Italy, the Pelopennesus Peninsula of Greece, western Yugoslavia, western Asia Minor, the islands of Corsica, Sardinia, Sicily, Rhodes, and Chios.

The leaves appear in February and are soon followed by the flowers but both disappear by June, giving it the longest resting period of any of the well-known species. The corms, like those of the *coum* group of species, are usually twice as broad as long, rarely exceed two inches in diameter, and are densely covered with reddish, minute, bunch-hairs, rather than with a layer of cork tissue as in such species as *persicum* and *neapolitanum*. The roots arise from near the center of the lower corm surface and are long and freely branched. Both leaves and flowers rise from near the end of a single short shoot originating at the center of the upper corm surface. The petioles and peduncles are "kneed," that is, travel horizontally for a predetermined distance from the center of the corm before becoming erect. In this species the horizontal portion of these stems

is thin enough to be called thread-like, but the erect portion becomes thick enough to make both petioles and peduncles fairly sturdy. If the corms are planted in a four-inch pot, the predetermined horizontal length of the stalks exceeds the distance from the shoots to the side of the pot and both petioles and peduncles follow the contour of the pot horizontally until the predetermined horizontal length has been attained.

One effect of these peculiarities is shown in the second photograph, in which it will be noted that all the petioles and peduncles are in close contact with the inner surface of the pot. Another result of these peculiarities is that it becomes exceedingly difficult to repot plants of this species, unless they are dormant, without breaking off most of the leaves and flowers. It is equally disastrous to disturb the soil surrounding the corms, when planted in the open ground, with any kind of a tool.

The leaf blades are approximately triangular in general outline, with two broadly rounded basal lobes separated by a wide sinus, and a broad apex. The margins are distinguished by from five to seven broad, shallow lobes, each traversed by one of the larger nerves and terminated by short peg-like projections of the nerve itself. The margins between these projections are variously curved, never notched but sometimes interrupted by similar, smaller lobes associated with smaller nerves. The tissue which forms the substances of the blades is thinner than in any of the other species, which results from the absence of a layer of closely packed palisade cells, which are developed in the blades of the other species. This feature makes the species but poorly adapted to dry and hot situations and explains why its period of growth is short, because it has been obliged to adapt itself to the "Mediterranean Rhythm." Both the upper and lower leaf surfaces are light green, but the upper is adorned with patches of grayish green, the pattern of which is quite different from those of the other species

The flowers, as shown in the two photographs, are easily distinguishable from those of any of the other species. As in those of all other species, the free ends of the petals are reversed through an angle of nearly 180° near the point at which they join to form the corolla tube. Especially noteworthy are the narrow, slightly-twisted form of the petals; the wide perfectly round edge of the tube; the lack of more deeply colored blotches at the base of the petals; and the well exserted style. The entire petal has a beautiful carmine-red color, which becomes somewhat deeper near its lower end. The flowers are reported to be somewhat fragrant, but I have not detected this in any of those I have grown. The anthers are distinguished by their blunt points and the nearly hemispherical, yellow warts scattered over their exposed surfaces.

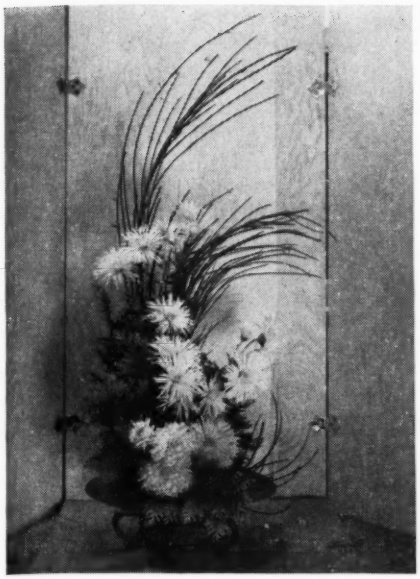
I find *C. hederifolium* one of the most charming and easily grown of the species, whose seeds are readily attainable. In England it has been reported to be somewhat tender but it seems to be hardy in this part of California. The seeds are, like some of the other species, slow in germinating. Those I have grown did not appear above ground for several months after sowing. I find it needs moderate shade and a thoroughly drained situation to prevent decay of its leaf-bearing shoots.

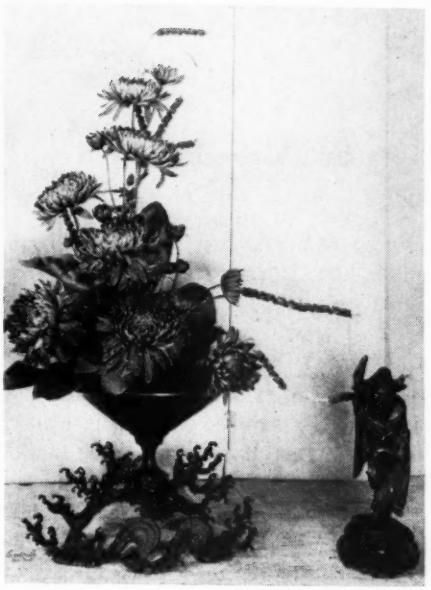
An enthusiastic account of a self-naturalized plantation of this species on the Devonshire Coast of the English Channel, written by Edward Cahen, appeared in "Garden Illustrated," 58 (1936), p. 149. He states: "My seed came from Berry Head, outside of Buxham, where it grows beneath trees, literally millions of them, in every nook and cranny, at the foot of high rocks, in the walls, along the paths, wherever seed has found enough earth to germinate. You can hardly call it a garden as no attempt has been made to cultivate the ground. Within sight of the sea they flower each spring and one can find seedlings in all stages from tiny first-year corms to those of flowering size." Undoubtedly there are favorable situations in the United States in which the species can be naturalized. My experiences with it have been limited, but I hope to be able to establish a self-perpetuating colony of it.

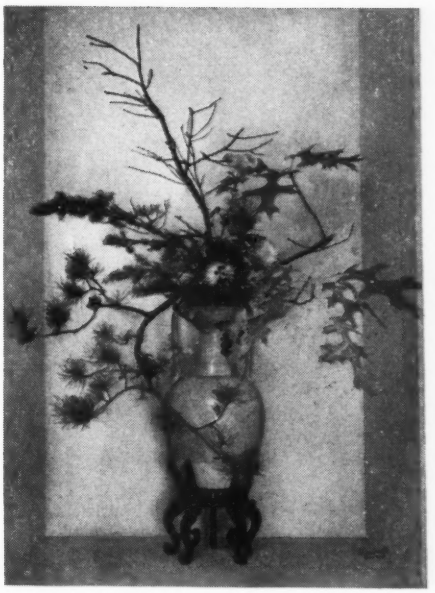
There are also two relatives of this species which have been cultivated in England on a very limited scale, but I have not been able to obtain seeds of them. One, *C. balearicum,* grows on the Balearic Islands south of the Iberian Peninsula; the other, *C. creticum,* is confined to the island of Crete. Both are white-flowered and smaller than *C. hederifolium.* The first is remarkable for the beauty of its leaves, but seems to be better adapted to an alpine house than the open border.

Plant of *Cyclamen hederifolium* growing in a four-inch pot, showing stalks of all the leaves and flowers arising at the edge of the pot.

A Review of The 1951 Show is A Preview of The 1952 Show





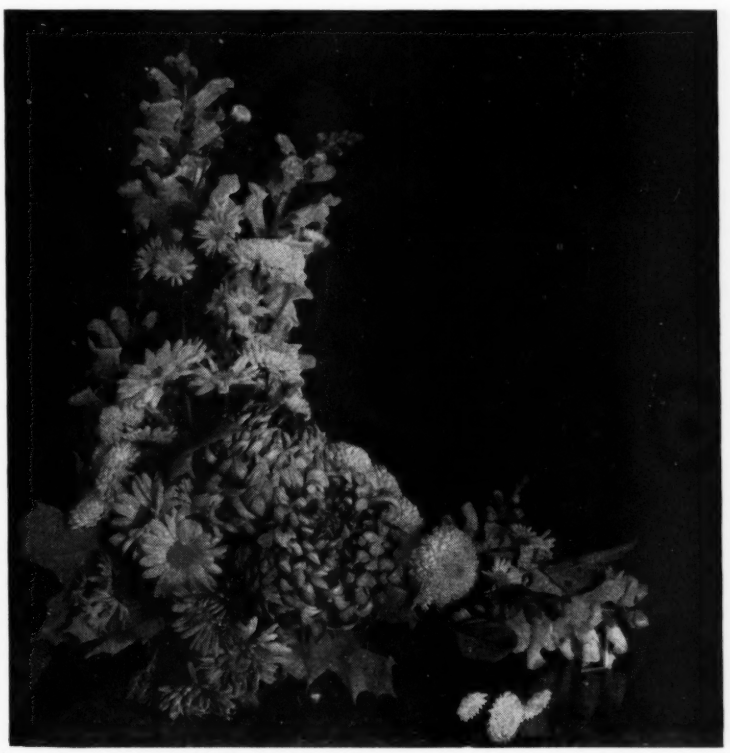


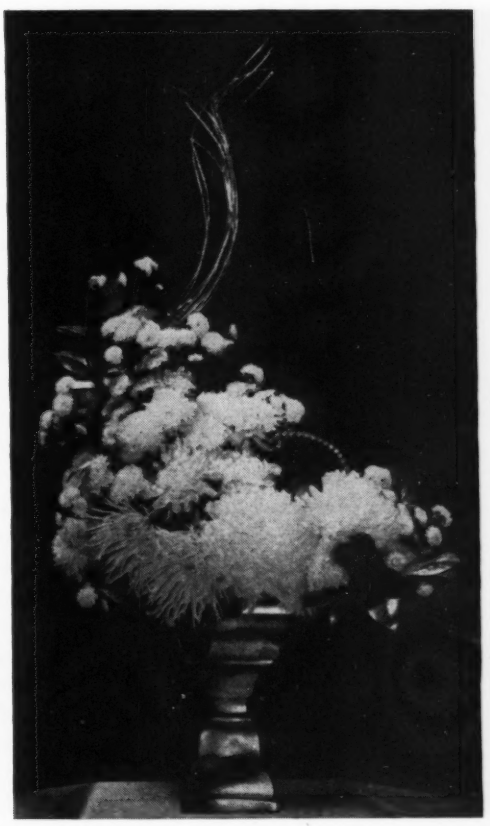
The artistic arrangements at the Seventh Annual Chrysanthemum Show at The New York Botanical Garden were generally conceded to be some of the finest ever exhibited at any fall show in New York City. The arrangements, illustrated here, forecast what may be expected of the artistic arrangement classes in the Eighth Annual Chrysanthemum Show to be held at the Garden October 24, 25, 26, 1952.

Top row: "Tradition" by Miss Margaret D. Crumbine, Jersey City, N. J.; "Spirit of the Orient" by Mrs. Angel Diaz, Tenafly, N. J.; "In the Japanese Manner" by K. Hasegawa, Kyoto, Japan.

Lower left: "What a Golden Autumn Hour" by Mrs. L. F. Simpson, Rye, N. Y.

Lower right: "To the Bride" by Mrs. Monroe Greenbaum, New Rochelle, N. Y.

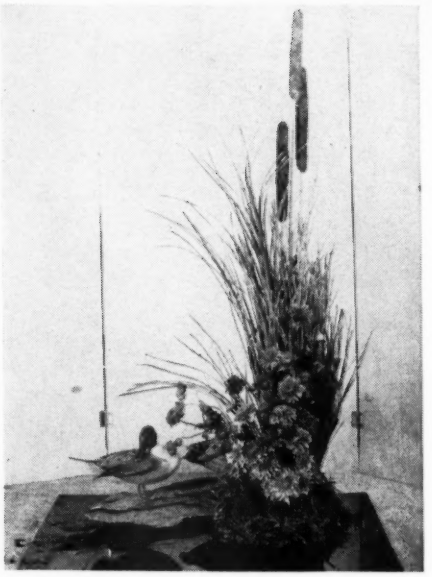




"Chrysanthemums for Pleasure" by Mrs. Frederick Lewis, Port Washington, L. I.

Chrysanthemums for Show

By Charles L. Tyrrell



"Good Hunting" by Mrs. Ronald Yocum, Chappaqua, N. Y.

EXHIBITION - QUALITY flowers are not the result of secret practices, but rather the knack of doing the right thing at the right time, from taking the cutting to cutting the blooms for the shows. Cultural exactitude is rewarded by blue ribbons.

The chrysanthemum in all its stages is not a difficult plant to handle, in fact, the ease in which it is handled often leads to the downfall of the hopeful exhibitor through carelessness or neglect.

Propagation may be by divisions of the old clumps, but the cautious and fastidious growers take strong, plump cuttings from the clumps and root them in sand, vermiculite, or a mixture of sand and peat moss. This may seem like a lot to do about nothing. However, when one stops to consider the amount of root diseases and plant diseases that are eliminated, then the effort is minimized.

Chrysanthemums are propagated commercially twelve months a year. The grower with a greenhouse may start taking cuttings in January. Those who winter their stock in a coldframe will find the last two weeks of April an ideal time to make cuttings. These should be ready to plant by May 20. Unless the beds are well incorporated with organic matter and the whole thoroughly pulverized and in a fine tilth, it is well worth the effort to pot or band the cuttings, using a mixture of two parts soil and one part peat moss, well rotted manure or compost with a little sand if the soil is heavy, and grow them for two to three weeks before planting in permanent beds.

Soils vary a great deal over the country, yet many good chrysanthemums are grown on all types of soil. Soil itself is not of the utmost importance, but the management of that soil is. The following pointers are offered for management of soil: It should test between neutral and pH. 6.5. If the test shows too much acidity, apply three to five pounds of ground limestone per hundred square feet of area. If the soil tests alkaline, apply one half to one pound of sulphur per one hundred square feet of area. A two-inch layer of rotted cow manure, peat moss or compost should be incorporated with an addition of five pounds per hundred square feet of super phosphate. This treatment should suffice until bud formation, when a feeding of complete fertilizer such as 5-10-5 or 4-12-4 should be applied.

When mums are grown for exhibition, it is very convenient to plant them together in a bed or, if necessary, several beds. The mums are planted ten inches by ten inches. If the beds are limited to three and one-half to four feet wide, this will permit working from both sides without stepping in the beds to handle the plants in the center.

The plants may be supported by bamboo canes sunk in the ground next to the plant. Each plant is tied with cotton twine or raffia as needed. Another form of support is a wire stretched just above ground, another about four feet above the ground, and galvanized stakes fastened top and bottom with patented clips. A very popular method is to stretch wires the length of the bed, starting with a wire on the outside of the bed and stretching one wire between each plant and having one on the outside of the bed. Cotton cord is stretched cross-wise, thus each plant has a square of its own. All the wires are fastened to a cross piece and supported by corner posts at the ends of each bed. As the plants grow the end pieces are lifted as necessary and fastened to the posts. This method is used extensively in greenhouses.

Time pinching is an important factor so that the crown buds are eliminated and all the sprays or standards have only terminal clusters. In time pinching, regardless of the previous pinches made, the last one is the important one. If the plants have been pinched previously, they must again be pinched on the date given and excessive growth later removed.

On varieties blooming October 25 to 28, pinch July 11; on varieties blooming November 1 to 5, pinch July 20. Select not more than four stems to a plant. If more than four develop, remove them, leaving the strongest.

(Continued on page 156)

PLANTS FOR SCANDINAVIA

By Sven Åhman

A SWEDISH scientific document from the mid-eighteenth century, which had been lost without trace for well over a hundred years, recently was rediscovered in, of all places, an American archive. No one has been able to say how it landed there. No records indicate that anybody ever read it until now. And but for two almost unbelievable coincidences, reinforced by a healthy portion of feminine tenacity, it almost certainly would have remained unfound, unread, and forgotten.

The document is a fifteen-page hand-written report of what happened to seeds of seventy-two American trees and plants when they were brought over to northern Europe and first planted in Scandinavian soil in the early 1750's. The manuscript, written in Swedish and dated July 1, 1755, is addressed to the Academic Consistory of the University of Åbo in Finland, at that time a Swedish province. Its author was Pehr Kalm, one of the disciples of the great Swedish naturalist, Carl von Linné or Linnaeus, famed as the father of systematic botany. Aided by a grant from the Swedish Government, Kalm had gone to America in 1748 at the age of thirty-one on leave of absence from his botany chair at Åbo. He spent almost three years studying the flora of the New World and collecting seeds of plants he hoped could be usefully cultivated at home.

But if a retired school teacher in upstate New York had not spent energy and postage stamps far beyond any reasonable call of duty, what Kalm told his academic superiors nearly two hundred years ago would still be unknown. The heroine of the story about the rediscovery of Kalm's report is Miss Elizabeth Simpson, a Vassar graduate of 1898, for thirty years a teacher of classical languages in Emma Willard School for Girls in Troy, New York, and since 1936 living in retirement — very active retirement, to be sure — in her native village of Mexico, in Oswego County on the shore of Lake Ontario.

Miss Simpson took up research in local history as a hobby on returning to her birthplace, and in 1940 she was formally appointed local historian for the township and village of Mexico. She has since published a weighty book about the history of her village, and before the Oswego Historical Society she has read various papers relating to the early history of the community. A couple of years ago one of those papers dealt with John Bartram, the eighteenth-century American naturalist. During his travels in America, Pehr Kalm had visited Bartram several times and received valuable advice from him. Miss Simpson mentioned Bartram's contacts with Kalm briefly in her paper, which was reprinted by the local newspaper, the "Oswego Palladium-Times."

That is where coincidence No. 1 came in. It is safe to say that Miss Simpson might have read her paper practically anywhere in America except in Oswego, certainly anywhere outside the largest cities or universities, without the slightest chance that anything about it would ever have become known in Sweden. But in Oswego at that time there lived a brother of the Swedish botanist, Carl Skottsberg. Theodore Skottsberg had come to the United States almost fifty years ago as a young man. He had no scientific interests of his own, but he was a conscientious newspaper reader, and when his eye fell on the account of Miss Simpson's lecture, he cut it out and sent it to his brother in Sweden.

Now for coincidence No. 2. Theodore Skottsberg's attention had been attracted by the mention of Pehr Kalm in the newspaper. But one thing he did not know was that his brother Carl had just been assigned by the Swedish Academy of Natural Sciences the task of writing a biography of Pehr Kalm!

"I was certainly surprised," said Miss Simpson, "when I received a letter from Sweden in which Professor Skottsberg asked me to let him know if there were any letters left in America from Kalm to Bartram or other scholars, since all similar papers at home had been destroyed when the city of Åbo was ravaged by fire in 1827. Only later did I discover the name Skottsberg in a telephone book of Oswego, and then I could guess how they learned of my lecture as far away as Sweden."

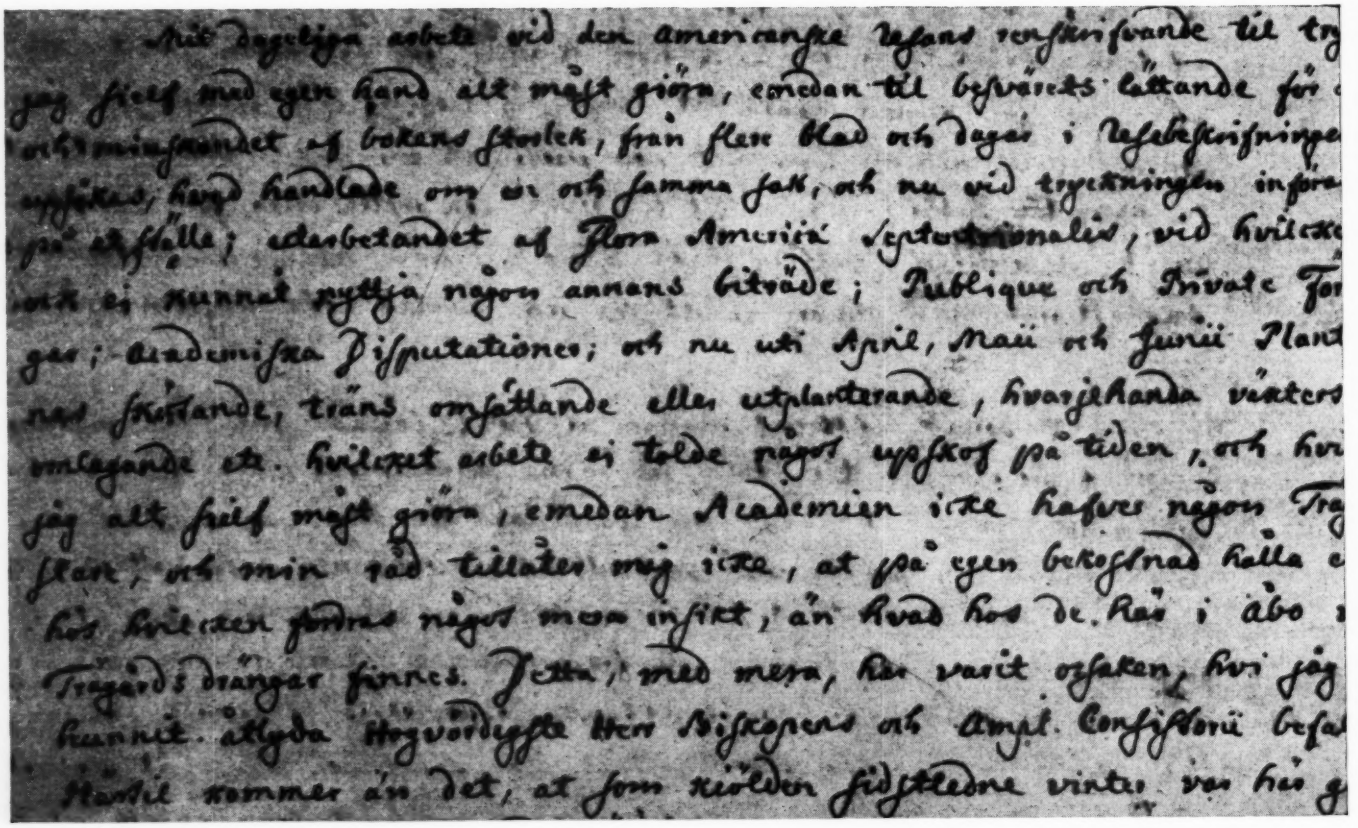
But Miss Simpson had no idea where to look. In Darlington's MEMORIALS OF BARTRAM AND MARSHALL, published in 1849, a number of letters to John Bartram were reprinted, one written by Kalm from Quebec in 1749. She copied the text and sent it to Skottsberg. But from then on her quest showed every sign of developing into a wild goose chase. The Library of The New York Botanical Garden referred her to a professor in New Or-

leans. The professor had no material, but told her to write Dr. Francis Harper, the foremost Bartram expert in the United States. Professor Harper said he believed the letter reprinted in Darlington's book was the only one from Kalm in existence on this side of the Atlantic; at least he himself had never come upon others while studying thousands of letters from early scholars in the libraries of Pennsylvania. Miss Simpson's hopes were further chilled when she turned to Professor Adolph B. Benson of Yale, who had translated Kalm's own book about his North American travels into English in 1937. Benson agreed with Harper that the printed letter probably was the only one in existence.

Nobody could have blamed Miss Simpson if, on the strength of such authoritative opinion, she had dropped the whole thing. But she did not. She continued sending letters right and left. For a while everybody she wrote to referred her to somebody else. At last she reached the Director of the Historical Society of Pennsylvania, R. N. Williams, II. There she made her big strike. Yes, Mr. Williams replied, there was a report from Kalm in the Society's collection of manuscripts. And Miss Simpson was able to have a set of photostats sent to Professor Skottsberg in Stockholm in time for mention and reproduction in his Kalm biography.

How did this manuscript, written in Swedish in Pehr Kalm's own meticulous hand, ever come to rest in Philadelphia? One can only guess. Professor Skottsberg says he finds it hard to believe that the copy Miss Simpson traced is the one that Kalm sent to the Åbo University authorities. Maybe Kalm wrote his report twice, says the professor, and maybe he sent one of the copies to Bartram when his American friend pressed him for news. Since it was written in Swedish, Bartram could not read it, and so it was left lying about. If there ever was another copy, however, there is no trace of it. It may have burned with the rest of Åbo in 1827. In the Swedish State Archives in Stockholm, Professor Skottsberg has found the financial accounts that belonged to Kalm's report, but no sign of the report itself.

Most of the purely scientific information contained in the lengthy report is known today through other writings of Kalm's, but many of its passages are of more general interest because of the light they shed on conditions at the time, and also on the somewhat testy temperament of the author. His report shows that it was submitted only after considerable prodding from the University authorities, who wanted to know what he had done with the money the Government had given him for his voyage to America, and what results his experiments had yielded. The good professor did not bother to hide his irritation. Over and over again he repeated in the report that he had spent as much of, if not more, of his own money as public funds, not only for the trip itself but also for his experiments after his return. At one point, he waxed downright philosophical about the drawbacks of public grants and Government controls. "In the future, as hitherto," he wrote, "I will accept public moneys so sparingly, and use them with such care, if I accept any at all, as to give no reasonable and unbiased person cause to state that I have been wasteful in the slightest



This is a selection from the sixteen-page manuscript in Pehr Kalm's own hand, dated Abo, July 15, 1755; photostat of which was presented to the Library of The New York Botanical Garden by Miss Elizabeth Simpson in October 1951.

degree. I say if I accept any public grants at all, for I must admit that I have had, and have, more than considerable reluctance against receiving public moneys, since it means having so many sitting in judgment over one."

Nor did Kalm think that his own exertions after returning were appreciated as they should be. "Not everybody realizes what toil, trouble, and expense is involved in such work as this. Many believe that you need do no more than throw seeds into the soil, and they will sprout like mushrooms."

The Åbo professor wrote at such length and with such vigor to convince the Academic Consistory that his nursery experiments entailed more than just "throwing seeds into the soil," that it is tempting to guess that even that august body had evinced some such suspicion. He had his American seeds growing both in a garden in the city itself, which he had bought "mostly with borrowed money" in the spring of 1752, and also on crown land some miles outside which had been put at his disposal by decree of the Government in Stockholm.

"It was incredibly hard work to weed the beds and tend the more delicate plants," he told his superiors. "The work was increased by the fact that my helper and the hired hands I used were completely raw and unaccustomed to such plants as these. I therefore could not escape the task of lying down and weeding almost all the beds myself, since it was impossible for others to distinguish all these plants from other weeds when they first came up and still were young. Furthermore, some plants required a soil and attention of their own, quite different from that of the others, so that often what was good fertilizer for one meant almost death for another. . . . Such have been my pastimes in my free hours that summer, and all the following summers also; so that while others were free in good weather to go for a walk or to take trips for pleasure, I have mostly had to amuse myself with such chores in and around my gardens."

Kalm also pointed out to the authorities that he had "always kept the hired men in beer, and generally also, in accordance with the customs of the country, given them their usual daily shot of aquavit in the morning," always out of his own pocket. Yet, with all differences, the labor market of those days had its similarities with today's. Kalm reported that he found it difficult to keep his men. As soon as he had them trained, other employers snatched them away by offering higher wages.

But Kalm's greatest worry in his experiments with American plants was, not surprisingly, the climate. He pointed particularly to the severity of the winters in Åbo, with temperatures eight to fourteen degrees Centigrade (fifteen to twenty-five degrees Fahrenheit) colder than in Stockholm across the Baltic. Contrary to most of those who complain about the weather, Kalm belonged to the school that also thinks something should, and can, be done about it.

"We shall wait in vain for any change and mitigation in these cold winters and the frequent frost nights in the summer," he wrote, "until the customary, highly harmful burning off of the forests is changed into the draining of marshy and useless morasses and their being turned into fertile and permanent fields or meadows."

Kalm's times were a utilitarian age in the Swedish realm. The money he had received from the Government for his voyage to America came out of the so-called Manufactures Fund, intended to promote industrial development and reduce the country's dependence on imports. In the end, not much came of his experimental cultivation of American plants. But in the report of 1755, now found by Miss Simpson, he still was optimistic about the possibilities "for the factories," as he put it, of some of his plants, although he pointed out that it was not enough to be able to nurse and coddle a plant along, unless there was some assurance that within a few years its cultivation would be a paying proposition. He did, however, warn his superiors not to be too impatient, but to give him those few years' respite, "for often one has to coddle plants while they still are young, particularly those which previously have not been accustomed to the climate; but when they gradually have become, as it were, more naturalized, they often challenge the indigenous ones."

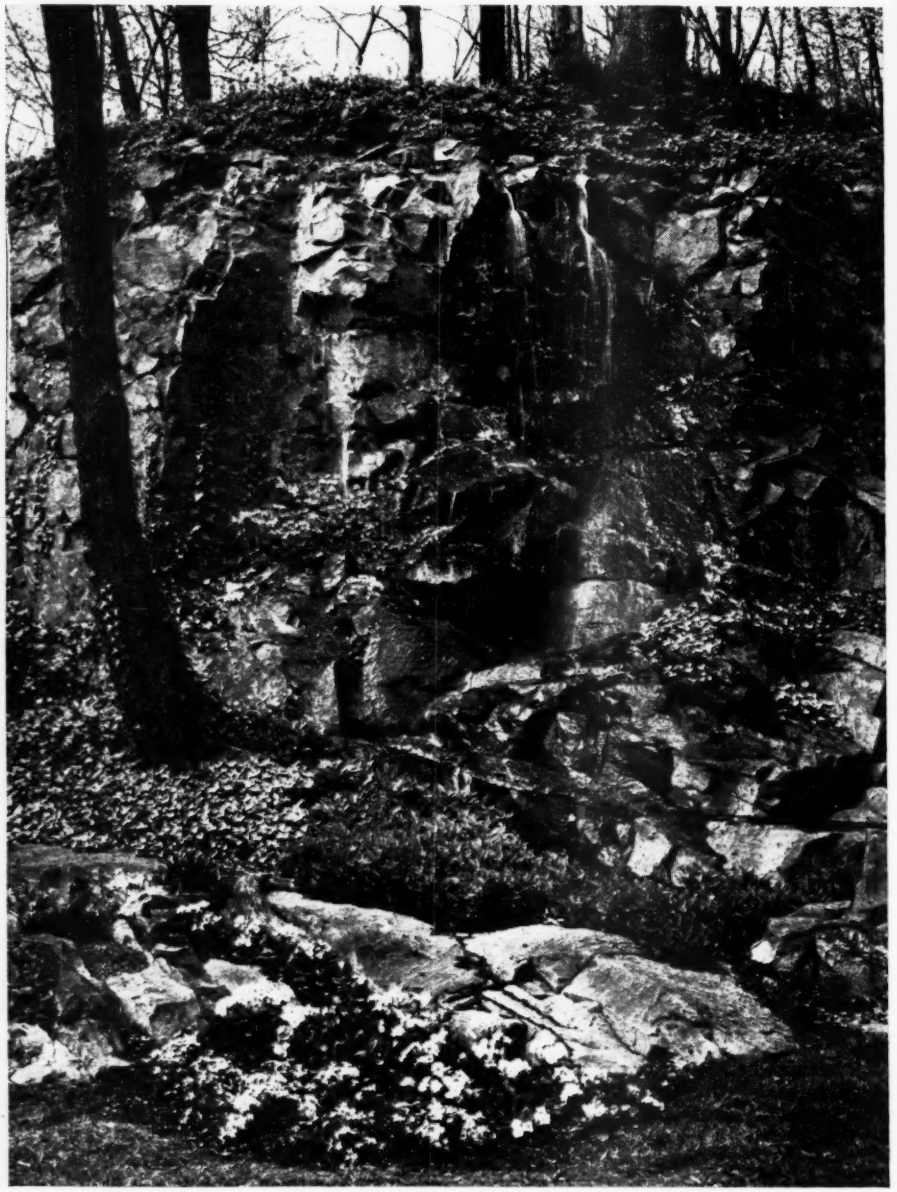
While warning that attempts to cultivate peach trees seemed clearly uneconomical, because so many of them died in the harsh Finnish climate, Kalm reported promising experiences with one variety of American cherry tree. "Of this excellent tree I have a goodly number growing, which have endured our winters rather well and are now prospering richly," he wrote. "I calculate that these trees alone, considering the use they may be in the future, are worth ten or even twenty times as much as I have hitherto received from the Manufactures Fund for these plantings."

Kalm also said he felt sure that from his American seeds he would get several varieties of fine apples which did not so far exist in Finland, and in spite of discouraging initial experiences he also had some hope with regard to pears. Both black and white walnut trees behaved reasonably well, he said. Some of the black ones, although planted where they were exposed to the coldest weather, were "as sound as if they were indigenous." He also praised the hardiness of the American black mulberry trees, desirable in the Swedish Government's attempt to build up a domestic silk industry, and commented particularly on their tendency to lose their leaves early in fall, "a quality that we cannot value highly enough," since it increased their powers of resistance to the cold winters. "The American mulberry trees, which are accustomed to a cold climate, seem to know how to make provision in time against the oncoming winter; whereas the others, which hail from warmer countries, do not know it, if one may say so."

The student of early American gardening might find useful information in some of Kalm's notes. He found that several varieties of the aspen tree he had brought from America had come up and withstood the hard winters. He discussed soil erosion and indicated that people even in that early period were aware of the need to take measures to prevent it. "One of the aspen varieties," he wrote, "grows in North America particularly on the banks of rivers where its supple roots bind the steep slopes so well that they are not washed away by rain, floods, snow or ice; for which reason they are also extremely valued there. They are planted there in the same way and with the same ease as the willow."

HOW WILL YOU ROCK GARDEN?

By **Dorothy Ebel Hansell**



A massive outcropping of trap rock, skillfully planted, in the garden of Leonard J. Buck, Far Hills, N. J.

For the greater part of my life I have breathed the rarefied air of the profession of gardening and, therefore, my gardening activities have been constrained by gardening ideals. Now, ideals are inspiring — they can also be very difficult, at times, to live up to.

My very first instruction in the art of gardening came from my "green-thumb" grandmother. At the tender age of eight or nine — and not always willingly — I helped her sow row upon row of annuals and plant perennials and rose bushes.

Several years later my gardening activities branched out considerably, for my brother and I and his chum and sister ambitiously undertook to grow vegetables, on a 100 x 100-foot plot, for our families. We were school gardeners under the direction of the late Arthur H. Herrington, an outstanding horticulturist whose name some of you may recognize as that of the manager of the International Flower Show for many years. Not only was the plot of substantial size for school children to handle, but it was most fertile, a pasture land belonging to a family friend who plowed it and then left the rest to us. The tomatoes, beans, beets, cabbages, potatoes, and other vegetables produced themselves so abundantly that our families couldn't keep pace with the baskets we filled daily. Was this abundance due to amateur's luck, the rich fertile land, the able instruction of our school garden director — or the combination of circumstances?

The war came to an end; people turned their attention from vegetables to flowers. I was next submitted to the tender mercies of another gardener, Luke O'Reilly. Luke was a world traveler and I recollect that pulling weeds never seemed such a chore, as I listened to his vivid descriptions of the gardens of Taj Mahal, of Hampton Court, of the rock garden in England that was built like the Matterhorn. And the last is exactly what Luke O'Reilly proceeded to reproduce on flat land, the front lawn of the Ebel's residence in Madison, New Jersey. Little did I realize, as I watched him pile stone upon stone, that some day I would refer to that rock garden as one of the worst examples of rock gardening — a "pudding stone pile," as the late Reginald Farrer termed such unhappy attempts. It was an abrupt mound of rocks without any relation to its surroundings. The only favorable thing that can be said about it was that the rock pockets provided homes for plants and the plants found conditions to their liking, for they bloomed prolifically. What the plants were I confess I do not remember, but I do remember the drifts of white and pink and blue and lavender and yellow that fell across the face of the stones. Luke was proud of this rock garden and so

The rocks used in building this rock garden were gathered on the north shore of Long Island and carefully placed to appear as stratified formation. While the land itself is very flat, grading of the soil has achieved a nice degree of elevation.

was I. I am not so sure, however, that my father and the other members of the family appreciated it — and I know the neighbors did not.

Luke also constructed another garden which was referred to as the "pool garden." That was, or could have been, the ideal rock garden for the location was naturally suitable. The ground on that side of our home sloped to a deep ravine that extended across the back of the property. Luke built an irregularly shaped pool beneath towering trees and edged it with Sussex County, New Jersey, limestone so that it looked natural, as though it belonged there. The overflow trickled over rocks to the ravine below. The plants enjoyed the cool, moist atmosphere and they also appreciated the flickering sunlight through the tall trees. Alpine plants are accustomed to less trying summer weather than we suffer from here on the eastern coast. Even the ones described as sun-lovers do not always appreciate the direct burning sunlight nor the mean humidity. Therefore, shade from high trees, not dense, but light, and a cool root-run are beneficial and enable alpines to endure our climatic conditions.

Time passed, as time has a habit of doing, and eventually my husband and I built our own home and began our own gardening operations. Everything had to be done "according to Hoyle" — on a miniature scale, of course, but as I had seen it done on the many estates I had visited throughout the country, and as I had learned garden practices from my good friends, the professional gardeners.

We wanted a rock garden. We had a good place for it, but it had to be made of Sussex limestone, considered the finest and most picturesque stone for a rock garden. As one of the founders of the American Rock Garden Society and its secretary, it would hardly do for me to use anything but the best stone. But the cost of transporting limestone from Sussex County to our home in Union County was prohibitive, and since we couldn't use the ideal stone for the rock garden, we didn't build the rock garden.

We had flowers from the first snowdrops and winter aconites to the last chrysanthemums on Thanksgiving Day. We manicured the edge of every path and border. We worked constantly and so had no time to see or enjoy the fruits of our labors. Our friends admired our handiwork, strangers even came some distance to see it. The Hansells had a small show place!

Then came World War II and Victory gardening, and our flowers were a casualty of the war, as were many other flowers. In 1947, when it no longer seemed necessary to grow tomatoes on the front lawn, the only really sunny place we had, my husband said, "We've gardened for show, we've gardened for food, now we are going to garden for pleasure. We are going to garden so we can live in it and enjoy it." And that is exactly what we have been doing the past five years.

We have finally attained the rock garden, or, more correctly, a rock ledge. However, it is not built of Sus-

(Continued on page 152)

A wall garden is one of the most satisfactory forms of rock gardening for a small property.

The Oldest Fruit Industry
The Fig

By **Ruth V. Caviston**

ADAM AND EVE gave the fig its first publicity. It is recorded in Genesis that they "sewed fig leaves together, and made themselves aprons." From that time, the fig tree has played its part in the human drama. In Deuteronomy, Jehovah is said to have brought the Israelites into a good land "of wheat, and barley, and vines, and fig trees, and pomegranates; a land of oil olive and honey."

Cato once held a fig aloft before his colleagues in the Roman Senate. "I would demand of you how long it is since this fig was gathered from the tree?" he said. All agreed the fruit was very fresh. "Yes!" Cato thundered. "It is not yet three days since this fig was gathered at Carthage. So near is Carthage to our shores." Having thus stirred his audience, the clever orator prevailed upon the senators to begin the third Punic War.

Cultivation of the fig reaches back into the mists of antiquity; it is the oldest fruit industry of which we have any record. The discovery of fossil figs in France and Italy has helped to prove the existence of this plant in ancient times.

Probably the fig was first cultivated in parts of southern Arabia and gradually became established throughout western Asia. Undoubtedly, as men moved from place to place, they carried figs with them in the form of dried fruit. This would account for their distribution in many areas. It is the concensus of authorities that fig culture was established in Greece as far back as the ninth century B.C., and that it was practised in Italy almost as early. The Moors played a definite role in extending fig culture to still other areas. Mohammed is supposed to have said, "If I should wish a fruit brought to Paradise, it would certainly be the fig." At any rate, when the Moors swarmed from northern Africa into Spain and Portugal, they brought their favorite fruit with them. Since then, fig crops have been produced in all the coastal provinces of Spain and in the extreme southern part of Portugal.

According to some records, European varieties of fig trees were first sent to the New World in a shipment to the West Indies in 1520. In his book, THE FIG, Ira J. Condit writes:

"Probably the first reference to the fig within the present limits of the United States is that of Pedro Menendez, St. Augustine, April 2, 1579: 'There are beginning to be many of the fruits of Spain such as figs, pomegranates, oranges, grapes in great quantity.' Captain John Smith in 1629 reported: 'Vines, figges and other fruits some have planted that prospered exceedingly; but their diligence about tobacco left them to be spoiled by cattell; yet they now begin to revive. . . . Mistress Pearce, an honest industrious woman, hath been there neere twentie yeares (1610-1629) and now returned saith shee hath a garden at Jamestown, containing three or four acres; where in one yeare she hath gathered neere a hundred bushels of excellent figges'."

Further reference to figs has been found in connection with later gardens in the state of Virginia. Stratford Hall was built about 1730 by Thomas Lee and was the home of many members of this illustrious family, including, for a short time, Robert E. Lee. Little is known about the original gardens at Stratford, but a notation by Lucinda Lee has been preserved in which she remarked that there were many figs on the property. Much more is known about the gardens at Mount Vernon, because Washington's notes and plans concerning them are still in existence. In his vegetable gardens was a large variety of plants and trees including limes, oranges, mulberries, currant bushes, and figs. In fact, upshoots from the original fig trees may be seen by present-day visitors.

By the end of the seventeenth century, fig trees had been established in all the Spanish colonies in the New World, whose soil and climate were suitable to their culture. Missionary priests were responsible for much of this distribution, particularly in the West. European priests were among the first to come to America and mission stations were established in Lower California (Mexico) as early as 1683. When Father Junipero Serra started his mission at San Diego in 1769, he brought with him fruits and vegetables for the nucleus of a garden. Included among his fruit trees were figs. In that manner was the fruit introduced into what is now the state of California.

Commercial fig orchards were established early in California, but the fruits, when dried, were inferior to imported figs from Smyrna in west Turkey. Efforts were made, therefore, to introduce the Smyrna type of fig to California. In 1880 G. P. Rixford secured 14,000 cuttings of the Smyrna fig. Mr. Rixford was then business manager of the "Evening Bulletin" in San Francisco and he distributed many of his cuttings to his subscribers. This led them to be known as the "Bulletin" cuttings. They received more than their share of fame, but when the trees began to bear, it was found that their fruits dropped when they were about the size of a marble.

Other importations were arranged by various concerns with the same results. Many explanations were offered, but suspicion developed regarding the cuttings themselves. It was reasoned that the Smyrna fig growers, fearing competition from United States, had sent cuttings of worthless varieties.

Meanwhile, considerable controversy had arisen in California and in Europe regarding the necessity of pollination for the Smyrna fig. It had been known for ages that the natives of oriental regions followed the custom of breaking off the fruits of the wild or caprifig and tying them to the branches of the edible Smyrna fig trees. Many scientists regarded this practice as a superstitious act on the part of ignorant people, and considered it no more. Yet, as long ago as 350 B.C., Aristotle had noticed that a small insect issued from the caprifigs and pierced the edible figs which then remained on the trees until mature. But this fact had to be rediscovered. Eventually, it was recognized that the Smyrna fig contains only female flowers and these must be pollinized by the male caprifig or seeds will not form. And the delicious flavor of the Smyrna fig is due to the number of ripe seeds it contains. The flowers of the fig are borne inside the receptacle formed by the pulp. They are pollinated by a tiny wasp which does, in fact, issue from the caprifig. It was this knowledge that stimulated interest in the introduction of the *blastophaga* or fig wasp into California.

Introduction of the *blastophaga* was first attempted privately, but the venture proved a failure. The insects were brought in at a time when the ripe caprifigs had all but disappeared for the season, so the wasps had no place in which to lay their eggs. At this point, the Government took a hand. The United States Department of Agriculture had followed these events carefully and was aware of the practical importance of success. In 1898, it commissioned Walter T. Swingle as an agricultural explorer and sent him to Greece. From there and from Algeria Mr. Swingle forwarded caprifigs to California. "Finally, some mamme figs sent by Swingle reached Fresno April 6, 1899, and were placed in a tree enclosed by cheesecloth. On June 23, there were found on the Roeding place, caprifigs from which fig wasps were emerging. Thus was the *blastophaga* successfully introduced into California."

Dr. Swingle died on January 19, 1952, at the age of eighty-one. He had achieved international reputation as a botanist and had not only advanced fig culture in the United States, but was also instrumental in establishing the commercial culture of the date palm and in introducing Egyptian cotton to Arizona.

The California fig industry has grown tremendously — it has become the third or fourth most important fig-producing district in the world. Inevitably, this business has influenced other fields as well. There is a large-scale canning of fresh figs each year, and preserving of figs has been done commercially for many years. About sixty-five per cent of the dried figs of California are ground into paste and used in "Fig Newtons" and other pastry products. Fig syrup and jam are also produced, though on a much smaller scale.

The United States has long been famous for its inventiveness and "know-how" and justly so. In many cases, we have improved Mother Nature's handiwork, but she still has a few good tricks of her own. It is interesting to remember that the commercial success of the California fig orchards is dependent upon a tiny insect, the *blastophaga*.

A thriving orchard of Adriatic fig trees at McHenry Ranch, Merced, California.

A Lesson In - - -

TRANSPLANTING

By **Edwin Beckett**

THE transplanting of plants, the act of transferring them from one rooting medium to another, varies considerably in technique; but the general treatment, during the period of transfer and until new roots are formed, is very similar. The object is to keep, as near as possible, a turgid condition in the plant until such time as the new rootlets are formed and a supply of water to the tissues is maintained. The accomplishment of this varies with different conditions; an attempt will be made here to outline the procedure in order to make a successful transfer.

TRANSPLANTING SMALL SEEDLINGS

As a general rule, small seedlings are given their first transplanting, or "pricking off," as it is sometimes termed, on the completion of their first true pair of leaves — not the "seed" or embryonic leaves.

The first step is to prepare a rooting medium suited to the plants and, in the case of plants growing indoors or under glass, the necessary receptacles in which to place them. Of the utmost importance is the drainage of these containers and the screening of the compost to a suitable degree of fineness. In the case of extremely small seedlings, such as begonias and azaleas, a very fine medium is desirable, in order that the soil particles may be washed in contact with the roots, thus avoiding interstices which form air pockets. After placing the drainage material in the bottom of the receptacles (pots or flats), fill them with soil, firm evenly and moderately and level off the surface carefully, pressing down with a small wooden tamper. The finished surface should be one-half or three-quarters of an inch below the rim to allow for watering.

Seedlings should be watered thoroughly before they are moved; a group is removed intact, separating the individuals carefully with as little root disturbance as possible. The act of transplanting consists of making a hole in the newly prepared soil with a dibble, or finger, even, holding the seedling in place in the hole and pressing the soil about the roots. Care should be taken to press the soil around the roots and not around the neck of the stem at the top of the hole. This is accomplished by driving the dibble point to the bottom of the hole, so that it makes about an angle of 30° with the plant stem, then levering the dibble towards the seedling, the point being the axis, and pressing the soil in contact from the roots towards the surface. Water thoroughly before too long a period has elapsed in order to settle the soil and, if possible, provide shade from sunshine and keep the seedlings in a close moist atmosphere until rooting commences.

This same general treatment is followed for small seedlings whether under glass, in frames, or outdoors. The main points to observe are repeated: suitable drainage, suitable rooting medium, care in handling seedlings and in placing soil in contact with the roots, avoidance of hanging them by the neck, water, and after-care in maintaining a close humid atmosphere.

When the operation is performed in the open ground, the bed is prepared as for seed sowing. Choose a dull day for this work and provide some shade — boughs, litter, or similar material may be used. Spraying with water frequently is beneficial.

TRANSPLANTING LARGER PLANTS

The transference of a plant from one pot to another of larger size is not a difficult task and rarely causes any concern. Generally, plants should be thoroughly watered before being moved, as they are, in most cases, well rooted. A "shift" to a pot two inches greater in diameter is the usual practice. After the drainage material has been put in the pot and a small amount of soil placed on it, the ball of the plant is held in position while soil is gently tamped to fill the space around it. The finished soil surface should be an inch below the pot's rim and the old ball of the plant should be so placed that it is slightly below this surface. Watering is deferred until the old ball begins to dry and then watering is done thoroughly. As with small seedlings, the roots are disturbed as little as possible and the ball never tamped; this is not only unnecessary, already being firm enough, but tamping breaks roots.

Larger plants, such as bedding material from flats, frames, or the open ground, are generally lifted by a trowel or spade with a good-sized ball of soil adhering to the roots. The holes to receive the plants should be larger than the balls in order that soil may be pressed in contact with the roots. When the transplanting is finished, the plants will be slightly deeper in the ground than before removal. Then they are watered thoroughly.

TRANSPLANTING OF TREES AND SHRUBS

Small trees and shrubs, provided they are nursery grown or have been previously transplanted, particularly those of a deciduous nature, are, with some exceptions, easily transplanted in the fall or spring without balls of soil adhering to their roots. When they are being removed, the roots must not be allowed to dry out; if the plants are to be out of the ground for any length of time, precautions must be taken to obviate this. Enclosing the roots in damp material, such as moss, and dipping

(Continued on page 155)

The Washington Arboretum

By **Brian O. Mulligan**

THE history of the present Arboretum site dates back to February 6, 1924, when the area of one hundred sixty-three acres known as Washington Park was set aside by the Board of Park Commissioners of the city of Seattle for a Botanical Garden and Arboretum, with the words: — "It is the wish and hope of the Board of Park Commissioners to work in accord with the University of Washington in this development and make the Arboretum and Botanical Garden one of the chief centers for accurate botanical and gardening information on the Pacific Coast." No development, however, took place at that time. It was not until January 1935 that a formal agreement between the University Board of Regents and the Park Commissioners was drawn up and signed. Under this, the city leased the area to the University for the purpose of forming a scientifically arranged arboretum, agreed to supply water, lighting, and police protection, but retained the right to use the area as a park. It was also stipulated that there should be an Advisory Committee to control development and progress; at the present time the ten-member Arboretum Board, composed of both University faculty and other members, meets regularly throughout most of the year under chairmanship of the Dean of the College of Forestry, Gordon D. Marckworth.

The area was subsequently expanded to two hundred sixty-seven acres, chiefly by the inclusion of shoreland lots on Lake Washington owned by the State or Park Board, with an adjacent former city dump closed prior to 1936.

The site is elongated, on a north-south axis. Both topography and soils are varied, most of the east side forming a higher ridge composed of sand or gravel, dipping to a natural valley of heavy clay through which runs a boulevard, then rising abruptly on the west side at the south end, but leveling off towards the north. There the area expands westward and includes the swampy margins of the lake as well as some reclaimed land.

The low area through the center is a natural "frost-pocket," since both air and water drainage are poor. This latter condition also encourages the growth of horsetail when the ground is cultivated, so that most of it is retained as grass planted with groups of suitable trees and is mowed regularly from spring to fall.

Most of the essential work in laying down the Upper Road, several miles of trails, the network of water pipes and drainage, and erecting the eastern boundary fence of native cedar woods *(Thuja plicata)*, as well as the construction of the stone cottage, the two greenhouses with their attendant propagating pits, two lath houses, many frames, and the rock garden and other sites where rocks were placed, was done between December 1935 and July 1941 by the W.P.A. The basic planting plan, sponsored by the Seattle Garden Club and arranged by families following the Engler and Prantl system, was the work of Olmsted Brothers of Brookline, Mass. With certain

Looking north across the Williams Memorial Camellia Planting at the University of Washington Arboretum, top of Rhododendron Glen.

Prunus yedoensis on the south bank of Rhododendron Glen has reached a height of forty feet.

modifications due to the site needs of particular families (e.g. Cistaceae, Saxifragaceae) or for lack of space (Rosaceae, Leguminoseae, Pinaceae), this has been followed.

The first plantings were made in the Pinetum in December 1937. Good growth has subsequently been made by *Pinus Coulteri* (up to thirty feet), *P. muricata, P. attenuata, P. contorta,* var. *latifolia* (twenty to twenty-five feet) and others; *Sequoia* and *Sequoiadendron* (thirty-five to forty feet), *Picea orientalis, P. pungens* var. *glauca, P. Abies* (to thirty feet) and *P. polita,* and *Abies concolor* (twenty to twenty-five feet). Cedars and abies planted on heavy clay have done poorly, as one might expect. More recent additions (since 1948) have been *Cupressus,* of which we now have fifteen species, the intergeneric hybrid *Cupressocyparis Leylandii,* and a few junipers, especially some of the increasing number of forms of the western *J. scopulorum.*

However, as the original Pinetum area was obviously too restricted, we have since November 1947 been planting a new collection of pines on Foster's Island, a low ridge of rather heavy soil projecting towards the lake and surrounded on three sides by swampy areas. This now comprises some thirty species, usually three plants of each, the majority raised here from seeds. In the same area are included birches (now twenty-seven species or varieties) and alders (fourteen species), the latter around the lower and wetter margins.

In 1937 also, the first plantings of eastern dogwoods and *Rhododendron Schlippenbachii* were put in on Azalea Way, a three-quarter mile long grass walk through the heart of the Arboretum, to be devoted to azaleas and Japanese cherries, the plan and plantings being sponsored by the Seattle Garden Club. The main planting of cherries (three hundred trees) and dogwoods (two hundred) took place during the winter of 1939 and spring of 1940. Amongst the cherries, Yoshino, Shirotae, Kwanzan, *P. Sieboldii, P. Sargentii* and *P. subhirtella* varieties are well represented; there are also groups or individuals of Shogetsu, Ojochin, Fugenzo, Hokusai, Horinji and Ukon. The spring flowering of the cherries is one of the most noticeable features of the Arboretum to the general public, much of the display being visible from the boulevard.

The azalea beds, being over heavy clay, have given us more trouble. However, with persistent weeding to eliminate convolvulus and quack grass, and with heavy mulches of leaves and/or sawdust, plus regular applications of fertilizers, it has been possible to maintain the original beds and add several new ones to accommodate some of B. Y. Morrison's Glenn Dale hybrids, of which Anchorite, Dayspring, Gaiety, Glamour, and Joya are especially featured. One of the most pleasing sights early in the year is the blooming of *R. mucronulatum;* this may occur as early as January if the weather is mild, or again not until March. Thereafter from early April *(R. Schlippenbachii,* followed by *R. yedoense, R. Kaempferi* and *R. Va-*

Brian O. Mulligan, Director of the University of Washington Arboretum, stands beside a fine specimen of Bishop pine, *Prunus muricata.*

seyi) until late June or early July *(R. indicum, R. arborescens,* and *R. viscosum),* we have a continuous and varied succession of species and hybrids in bloom along both sides of a considerable part of Azalea Way. A large planting of *R. Kaempferi* has a specially shaded bed to itself; we generally attempt to have as large groups as possible of each kind. The problems of color combinations and separations, and succession to avoid large flowerless spaces, are gradually being worked out but will certainly take several more years to complete, as will the entire planting. For the present we rely considerably on such species, varieties and hybrids as *altaclerense, nudiflorum, mucronatum* and its forms, *japonicum, calendulaceum* and hybrids, *obtusum Arnoldianum, Sanderi* Ruby and Mars, *occidentale* and hybrids, *viscosepalum* var. *Daviesii,* the Kurume Daybreak, and some of the Chugai varieties imported in 1940-41. The latter seem to need more shade and shelter to thrive.

Between Azalea Way and the Upper Road to the east are three short connecting valleys — Woodland Garden, Loderi Valley, and Rhododendron Glen, respectively, from north to south. Each of these is being developed for a particular purpose. Woodland Garden, sponsored and largely maintained both as to labor and plants by the West Seattle Garden Club, has been designed by R. J. Hansen, Assistant Director of the Arboretum, to contain a wide range of native American woodland shrubs and other plants — viburnums, azaleas, hamamelis, *Mahonia Aquifolium,* sourwood, crabapples — as well as a few ornamental Asiatic species, *Rhododendron Schlippenbachii,* Japanese maples, *Cornus Kousa.* These will provide interest and color from early spring until late fall in a setting shaded by mixed native trees, principally the stately Oregon maple *(Acer macrophyllum.).*

Magnolia Kobus var. *borealis* at the head of Rhododendron Glen, April 16, 1951. In December 1951 its height was sixteen feet. This magnolia first flowered in 1949.

Loderi Valley is being especially devoted to the larger leaved and flowered rhododendrons, members of the *Falconeri* and *Grande* series, named forms and seedlings of the magnificent hybrid *R. Loderi,* and a few others of outstanding merit — Azor and *R. diaprepes,* for example — in combination with magnolias, especially the taller species such as *Campbellii, tripetala, Veitchii,* and the more recently introduced Chinese *Dawsoniana* and *mollicomata.* At the lower west end are groups of native azaleas, *arborescens, calendulaceum, canescens, nudiflorum, occidentale, viscosum,* with sourwood among them.

Rhododendron Glen has been one of the major projects in the Arboretum from the earliest days, the nucleus being the collection, principally of species, donated by the late Dr. Cecil Tenny of Seattle and planted in 1938-1939. Narrow and heavily shaded by native conifers at the upper end, where a considerable quantity of rock was laid on the banks and along the small stream by the W.P.A., it widens out abruptly to a grassy slope above Azalea Way and a pool.

The south bank is closely planted with medium to large-sized species and hybrids which produce a succes-

Alaska cedars, *Chamaecyparis nootkatensis,* guard the bridge over the boulevard; Oregon maples, *Acer macrophyllum,* in back of them.

sion of very varied types and colors of flowers from late March *(R. sutchuenense)* until mid- or late July *(R. discolor* and hybrids) or even August *(R. auriculatum)*. There is a mass planting of *R. Fortunei* and hybrids thereof, which in 1951 and 1952 bloomed unusually freely, as well as large and (in April) most conspicuous examples of the mauve to bluish lavender *R. Augustinii*. The *Triflorum* series in general is concentrated in this area, together with the distinctive *R. cinnabarinum*, a quantity of the free-flowering *R. rubiginosum*, and some mature specimens of *R. decorum*. Amongst them have been placed a few *Magnolia denudata* and the cherry Shogetsu, whilst on the lower part of the bank is a group of Yoshino cherries approximately forty feet tall, easily seen from the boulevard in early April. Nearer the head of the Glen we have been carefully placing young plants of the Chilean fire bush *(Embothrium)* in recent years. In 1953 the oldest of these will probably bloom, thus adding a new and striking feature in May.

To the north of the Glen is another slope well covered with a mixed assortment of named and nameless hybrids, including twenty-seven numbers of the Dexter hybrids of *R. Fortunei*, received in 1939. These in mid-May annually produce one of our best displays. Below them is a bed facing west, allocated to series *Fortunei*, of which we have some twelve distinct species, now nearly all large plants and usually flowering heavily at their appointed seasons from early April until July. Series *Thomsonii* is located above and north of these, on a steep slope of sandy soil. Our general policy is to plant species of each series together in one site, as far as possible in a position suited to their particular needs. The record file shows that we have approximately two hundred fifty recognized species of evergreen rhododendrons in the Arboretum, with others still under collectors' numbers or unidentified.

Where the Glen meets the Upper Road is the camellia collection, of which the initial planting, the Mary E. Williams Memorial Garden, took place in 1944-45. Extensions southwards were made in 1949-50 to take care of additional varieties of *C. japonica*. Mr. Hansen designed a group of new beds with the plants arranged according to flower form and color. Several other species and some related genera *(Stewartia, Eurya, Franklinia)* were included. Varieties of *C. japonica* now number one hundred forty and the peak of the bloom is usually from early to mid-April.

Other major collections in the Arboretum can be mentioned only briefly. Attention is being paid to hollies, especially the evergreen species, partly because the growing of English holly for Christmas is a minor local industry in Washington and Oregon. The State Conservation Society has also taken interest in this and supported the acquisition of a larger collection. First plantings in the new area by the Upper Road were made in the spring of 1949, the species and hybrids being arranged in large irregular beds according to their botanical relationships. Of *Ilex Aquifolium* we now have about a a dozen forms planted, of *I. opaca* nine, of *I. crenata* six, with more of each still in the nursery. About fifteen other evergreen species or hybrids are being grown, but several *(I. Cassine, I. insignis*, and *I. purpurea)* were severely damaged by the abnormal winter of January-February 1950.

Since the acquisition in 1940 and 1941 of a number of *Magnolia* species from nurseries in this country and Japan, the collection has been steadily increasing, especially since 1947. Of some nineteen planted species twelve have now flowered, including a good form of *M. Kobus* var. *borealis* from Japan, M. *macrophylla* and *M. salicifolia; M. Fraseri* and *M. acuminata* flowered first in 1952. We shall have to wait longer for *M. Campbellii, M. cordata* and *M. mollicomata*. Of the hybrids, *M. Veitchii* is growing well and has bloomed during the past two years. Second generation seedlings from the National Arboretum hybrid between *M. virginiana* and *M. grandiflora* are growing rapidly; both the parents now flower here annually. In the greenhouses or lath houses, about eight other species or hybrids are coming along satisfactorily. We still hope to add to the number, for neither *M. officinalis* nor *M. pyramidata* is as yet represented, besides others from Asia. About eighty-six magnolias have been placed in the Arboretum in the past few years, either in the allotted area for the family west of the Upper Road, or near to it.

One other major area that deserves mention is the former city dump site between the boulevard and Lake Washington. In 1945 most of this, about seven acres, was covered by brambles seven to eight feet high; beneath them was an uneven terrain full of bottles, cans, bricks, and other very solid materials. By persistent work with the tractor and cultivator, and by hard manual labor, between three and four acres of the area have now been planted and are kept cultivated. On approximately two acres is a combination planting of crab-apples and rose species, each genus again arranged according to its natural group. The first plantings were made in the spring of 1950; of the former we now have almost fifty distinct kinds, of the latter approximately eighty-five, plus some thirty old-fashioned types of roses. These are all close to the boulevard, and within a few years should make a very lovely floral display in spring and early summer and again to a less degree with the fruits between September and Christmas, for the benefit of nearby residents as well as visitors.

Another two acres on this cleared ground have been allotted to the mountain ash groups *(Sorbus)*, of which there are several distinct subgenera. Planting began early in April 1951 and was soon followed by an abnormally dry summer, so that the plants had a hard struggle for existence in their first season. More plants were set out in their various sections and we now possess sixty-five in all, representing twenty-seven species.

Much has had to be omitted from this account — the native woody material, lesser collections including cistus, peonies, hypericums, oaks, the numerous smaller genera of *Ericaceae*, now becoming well represented, the garden of winter-flowering shrubs, and the considerable parts played by the Arboretum Foundation and supporting garden clubs and Arboretum Units. Nevertheless, perhaps there is sufficient to show that this active young scion of the University's College of Forestry is developing as rapidly and energetically as its funds and small staff will permit, and that it fully intends to more than fulfill the hopes of the sponsors of 1924.

ROSE VARIETIES

PART II

By **Edwin De T. Bechtel**

LINNAEUS described fourteen species in 1762, but soon changed to twenty-one. The English, French and Dutch botanists made various guesses. In 1820, an extraordinary genius at twenty-one published his system of rose classification. This is John Lindley's ROSARIUM MONOGRAPHIA, one of the great books of botany. It comprises eleven sections with seventy-six sub-divisions as species and subspecies. This classification prepared the way for that of M. Crépin at the end of the last century. He was the director of the Brussels Botanical Garden and divided the rose genus into fifteen sections and fifty-five species. Prof. Bailey in his CYCLOPEDIA OF HORTICULTURE approves the modification of Crépin's system. It has fifteen sections and sixty major subdivisions. Dr. McFarland in his MODERN ROSES III, 1947, adopts Prof. Rehder's classification, which includes two hundred sixty-six species. In the Royal Horticultural Society's new DICTIONARY OF GARDENING, which has just been issued, the total number of species is given at about one hundred and twenty-five, of which ninety-five are Asiatic, eighteen are American, and the remainder are chiefly natives of Europe or northwestern Africa.

And what becomes of the roses of our gardens, the cultivated roses, in the wake of these complicated theories of classification? We have mentioned hybrid teas, hybrid polyanthas, hybrid rugosas. Of course, none of these forms is found or referred to in the botanies; they have no scientific status, for the botanist is not interested in hybridized, cultivated roses. We have noted how mixed and uncertain is their genealogy and how broken are their pedigrees. Thory, the author of Redouté's text, calls the carelessly produced Gallica hybrids of his time, *"monstres."* They were *métis,* mongrel, half-caste, half-bred, the product of *hybridité adultérine.* But in spite of these irregular flirtations and in spite of the paternity of unnamed and unknown seedlings and the breaking of the laws of the scientists, hybridization and the origination of new types have been responsible for the popularity of the rose and the fascination and beauty of its hybrids. Miscegenation has been pursued freely and gaily, and new forms, new varieties of roses, have increased multitudinously from year to year since Josephine became the patroness of roses at Malmaison.

In 1902, when M. Gravereaux listed the roses which he planted in his famous Roseraie at L'Hay, near Paris, his total was 6,759. There were 1,690 hybrid perpetuals and only 271 hybrid teas. In 1906, Siemon and Cochet gathered from all sources available to them, past and present, all known rose names. The total of their extensive list was 11,016, or over 9,000 varieties, after allowing for duplications. In 1931, the rose growers of Holland published their *Rosennaamlijst,* which unfortunately has not been supplemented by any addition. Their total is more than 5,000. Three-fourths of the roses listed were twentieth century roses and principally hybrid teas. About fifteen years ago, Dr. Nicolas, the brilliant French hybridist who made so many originations during his career in the United States, estimated that a total of 16,000 might be named, beginning with Josephine's collection. And, of course, that number might now be increased by several thousand. Finally, Dr. MacFarland's most invaluable MODERN ROSES III (which was completed in May, 1947 and includes only the roses in commerce and of historical botanical importance) lists a total of 5,284 varieties, of which 2,859 are hybrid teas, 450 are polyanthas and hybrid polyanthas, about 170 are hybrid perpetuals. Professor Rehder's list of 296 species is included, and also about 500 climbers, climbing hybrid teas and ramblers. MODERN ROSES III will shortly be revised and published as MODERN ROSES IV, with a very considerable addition of the new varieties which have appeared in the last five years.

The infinite varieties are, of course, due to the structure of the rose cell and the intensity of rose hybridizing and rose culture since the days of Malmaison. First in Josephine's time came the unrestrained encouragement of the seedlings of the natural crosses of the Gallicas. Varieties, bizarre, striped, spotted, and mottled, as well as the beautiful Agatha Gallicas which are illustrated by Redouté, came and disappeared, although some of the finest Gallica hybrids persisted until the first decade of this century. Following the Gallica hybrids came the Bengal or China hybrids resulting from the crossing of *Rosa chinensis semperflorens* with Damasks, Centifolias and the Gallicas themselves. The Bengal or China hybrids became popular and were planted in many gardens in the United States in great numbers in the first half of the last century. The Bourbons were another French origination. They resulted from the natural pollination of the common China rose with the monthly Damask. That hybrid was also very popular in the United States during the last century; and the Souvenir de la Malmaison, the Hermosa and the Gloire des Rosomanes still represent the Bourbons.

In the meantime, there was much experimentation to stimulate the Damask strain. The resulting Damask perpetuals were very successful, and

the Rose du Roi was advertised by Buist of Philadelphia as guaranteed to bloom "profusely and perfectly from June until Christmas."

Out of these varied hybrids came the strains of the hybrid perpetuals. Vibert and Laffay hybridized Gallicas, Bengals, Bourbons, Damasks, and, turning back to *Rosa chinensis semperflorens* and the Damask perpetuals, managed to originate the vigorous and beautiful *remontants,* the hybrid perpetuals. Probably Laffay's Princess Hélène, a cardinal-red rose which dated from 1837, is the first hybrid perpetual. His originations which continued up to the middle of the last century were prolific, and he and Vibert established the status of this new variety. At first it was regarded as something of a parvenu, because many of its new originations would not repeat dependably. However, by 1860, it was established and became the world's favorite rose variety for over half a century. Even as late as 1902, Gravereaux could find 1,690 hybrid perpetuals for his garden at L'Hay as against 296 teas. Among these hybrid perpetuals, I pay special tribute to Georg Arends, Henry Nevard, Ulrich Brunner, Baroness Rothschild, Louisé Crette, Général Jacqueminot and Paul Neyron; and to add a sister who was not originated until the nineteenth century, one of the best white roses, Frau Karl Druschki. And these are only a few of the beautiful collection of one hundred and four hybrid perpetuals in The New York Botanical Garden, which I checked and described three years ago.

As to the next class of varieties, the hybrid teas, their first origination came in 1867 when La France made its bow. The unusual Cheshunt Hybrid, originated by G. Paul in 1872, was the first hybrid tea generally recognized as such. Actually, the career of the hybrid teas in Europe was slow in its consummation, as was the case of the hybrid perpetuals. Even at the beginning of this century, the hybrid tea was looked upon as a tender variety, unable to live in the rigorous climate of the United States. Its popularity and the general success of hybrid teas owes much to the substitution of *Rosa multiflora* as an understock. But the discussion of understocks continues, for we need sturdier hybrid teas.

Today, our most recent and most popular class of varieties are the hybrid polyanthas or floribundas. Outstanding are the originations of Poulson of Denmark and the contributions of the American hybridizers. But it is a long and complicated story, which deserves a separate paper. Of course, the name hybrid polyantha or floribunda does not correctly describe this astonishing and beautiful new variety; and there is great need of revising and designing rose varieties in general.

After referring to this multiplicity of roses, we can still say of the rose:

> "Age cannot wither nor custom stale
> Her infinite variety."

Alas! many of the great varieties are falling out of the ranks of the armies of roses and are disappearing. We should try to preserve the best. They need friends and sanctuaries in public gardens and in your own gardens. They should be cherished for their beauty and fragrance and for their form and reliability. And one should not be misled by the popularity of hybrids and floribundas, for they are only two of fifty-eight classes of the varieties of cultivated roses.

ROCK GARDEN **(from page 143)**

sex County limestone. We were able to obtain at very little cost some gray rocks. They are quite shiny, being mica rocks from Pennsylvania — glitter, by the way, isn't considered a good characteristic in rock for a rock garden — but the rocks are flat and while the large pieces are heavy, they are not too heavy to be handled by one man. Moreover, the pieces lend themselves admirably to the making of a rock ledge. They can be put together easily and our rock garden plants and native plants — and there are many native plants which fit admirably into a rock garden — must be satisfied with these rocks, for they are growing lustily.

Do not misunderstand me. I do not mean to infer that I do not believe in following the best advice from the best sources, but that the best or ideal is not always attainable. One should not refrain from having a rock garden — as we did because we couldn't afford limestone — but make the most of what he has and try to approach as nearly as possible to the best rock gardening practices. In other words, if limestone is out of reach, then resort to sandstone, granite, schist or tufa, as may be within reach. Boulders, too, may be used, but only as a last resort, for boulders do not lend themselves to graceful design. They are better employed in a boulder-strewn meadow, for example, as though they had rolled down a hillside.

A rock garden may be large — I have wandered through several which cover one, two and even three acres and include pools and waterfalls. The rock garden of Leonard J. Buck, member of the Board of Managers of The New York Botanical Garden, at Far Hills, New Jersey, has been aptly described as "majestic, massive and spectacular." Actually, there are several rock gardens connected by stretches of woodland, by plantings of ferns and flowers. Mr. Buck, with the able assistance of Zenon Schreiber, has adorned the outcroppings of trap rock with rare and exciting gems of the plant world, has carpeted the valleys between the sheer cliffs with partridgeberry, wintergreen, galax, and shortia, and planted them with wide bands of polyanthus and Japanese primroses.

Another extensive rock garden is located in Chestnut Hill, Massachusetts. It is one of the finest and oldest in the country. In developing the garden, its owner, Mrs. Clement S. Houghton, was inspired by the writings of Reginald Farrer and Henri Correvon. The property was particularly adaptable to the construction of a rock garden, being blessed with rocks which the glacier had deposited thousands of years ago, with a gently flowing brook which was broadened into a stream and pond, with woodlands which were opened up and attractively planted. Many plants from all over the world have been successfully grown in this rock garden since it was first started more than thirty years ago.

A rock garden may be very small — I have seen two "pocket edition" rock gardens, one ten by ten feet, one ten by eighteen, and they were no less well planned, constructed, and planted than the large ones. Yes, even to a tiny pool and diminutive stream. These gardens, large and small, are

picturesque and at the same time provide ideal growing conditions for alpine and rock plants.

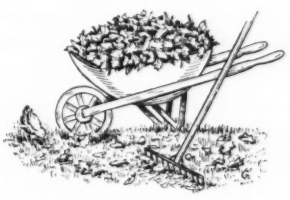
However, you can grow alpine and rock plants — and grow them well without having a picturesque rock garden. On a very flat piece of land, one rock gardener has created an attractive home for his collection of unusual and rare plants. He has rocks, to be sure, gentle elevations, and a stream; but his garden does not have the striking gradations in height one generally associates with a rock garden. Instead, this enthusiastic gardener has concentrated his efforts in providing the exact soil, cool root-run, moisture, shady or sunny spot — in other words, in meeting the particular requirements of each plant.

You can also grow these plants in a planted wall, one of the happiest kinds of rock gardening for a small property, for they furnish much beauty and demand a minimum of attention. The planted wall can also serve a dual purpose, for example, as a retaining wall to hold an embankment or to make a terrace. A hillside can be graded into sections of different levels and the several sections separated by planted walls. The head of the family — or the gardener, as the case may be — will be much happier, too, being spared the exertion of pushing the lawn mower up and down the hillside, and the appearance of the property itself will be improved. Within a few miles of my home, the front lawn of a colonial residence has been treated in this manner. As these retaining walls are in shade, they have been planted largely with ferns, dicentras, corydalis, primroses, epimedium, *Iris cristata,* lilies-of-the-valley, vinca, and violets. I am familiar with a wall garden on Long Island, which runs the length of the driveway; it starts at a height of two feet and reaches a height of six at the far end. This wall is exposed to almost full sun and so it is planted with sun-lovers—phlox, alyssum, dianthus, arabis, arenarias, aubrietias, sun-roses, sedums, sempervivums. In May and June, it presents a solid sheet of color.

Finally, you can raise alpines and rock plants in raised beds or in an alpine house. P. J. van Melle, well-known nurseryman and author of the book REVIEW OF JUNIPERUS CHINENSIS, published by The New York Botanical Garden, at his place in Poughkeepsie, N. Y., has successfully grown many kinds of mountain and lowland plants in raised beds. The soil in these beds has been carefully prepared and rocks placed here and there to furnish pockets for the plants. Mr. van Melle has always thought well of tufa, for this rock of volcanic origin is especially porous. Of course, when you grow alpines and rock plants in raised beds or in an alpine house, your primary interest is in raising this type of plants, and not in a rock garden.

So choose a type of rock garden most suitable to your own home grounds, and then give play to your imagination, provided you temper your imagination with good gardening sense.

Excerpts from the talk given by the Editor at the graduation exercises at The New York Botanical Garden on June 12, 1952.



THE FOOD PROBLEM **(from page 134)**

Thereafter the whole process, from seeding to harvest, must be started again. Essentially, this system of utilizing solar energy constitutes what is industrially termed a batch process. In any industrial process, *time* is an all-important element. When sunlight is available, it should be used at the highest possible efficiency and as continuously as possible. Such is not the case in present agriculture. In contrast to this, by the use of a plant such as chlorella, a continuous process can be maintained with comparatively high utilization of sunlight. Such a continuous process would have many advantages for large-scale food production, especially if use can be made of modern industrial and engineering experience in allied fields.

The undertaking consists essentially in providing conditions for algae to grow continuously at the maximum rate, and at the same time in harvesting a portion of them without disturbing the growth of the main culture. To accomplish this, the algae are given just as much carbon dioxide and mineral nutrients as they can utilize under the best attainable conditions of illumination. What is desired to make such a scheme practicable is the attainment of high yields of chlorella cells, but not only high yield alone; there must be high yield in the shortest possible time. Yield must, therefore, be considered as the weight of algae produced in unit of time. Now the algae must be grown in some kind of an installation or factory. The building of this equipment naturally costs money, and it should be so designed and constructed to produce algae as efficiently as possible. That is, it should be made to utilize solar energy by means of the growing of algae so that every dollar spent in construction and maintenance of the factory produces the highest possible yield of product. The cost of the factory is about proportional to the area of the culture chambers which are exposed to sunlight. The yield of algae harvested is a measure of the efficiency with which sunlight is utilized in the factory.

Needless to say, in as complex a process as the growth of living organisms such as algae, demanding a constellation of carefully adjusted conditions for their continuous development, it is impossible to predict the most efficient design for doing this on a large scale. A vast amount of information has been gathered on a laboratory scale, and, in fact, this information constitutes the basic knowledge on which a large-scale process must rest. But there is many a lapse between the test tubes and the vats. In principle, the elements for growing algae on a large scale are relatively simple. These entail: (1) a growth container, the upper surface of which is transparent; (2) means of circulating the culture solution within the container; (3) means of introducing carbon dioxide-enriched air continuously over the culture solution; (4) a means of controlling temperature, at least in some geographical localities; (5) a means of harvesting the algae as continuously as possible; and (6) methods of processing the harvested algae.

The practical problems involved in a large-scale undertaking with these requirements are primarily of an engineering nature. Efforts to solve these practical problems are in turn bringing

(Continued on page 156)

The Late T. A. Havemeyer

Lilac Fancier

By **John C. Wister**

It is most fitting that this beautiful tablet, bearing the name of Theodore A. Havemeyer, should be placed here at the entrance to the collection of lilacs from his garden in Brookville, Long Island.

Not often in the past has such recognition been made to persons who did outstanding work for horticulture compared with the many memorials to leaders in other activities, especially those in the arts of war rather than of peace.

Mr. Havemeyer's work is not known as much as it should be. His excessive modesty prevented his ever telling about his work himself. For many years President of the Horticultural Society of New York, he was active in many flower shows. He was interested in irises, peonies, lilies, gladiolus, and other plant specialties, as well as in lilacs. But lilacs were his first love and it was with lilacs that he made his greatest contribution to the American garden.

He became interested in them through his friendship with Prof. C. S. Sargent of the Arnold Arboretum. Mr. Havemeyer knew the Arboretum well and learned much there during the early years of this century. I do not know the exact date when he began his own collection but it must have been about 1905, because by 1910 or a little later he was visiting the great Lemoine in Nancy and bringing from there the finest Lemoine importations. M. Emile Lemoine had such admiration for him that he wished to name one of his finest lilacs T. A. Havemeyer. Mr. Havemeyer was not willing to have his own name used, but did suggest that his wife's name might be suitable. And so it came about that a wonderful lilac bears the name of Katherine Havemeyer. Introduced by Lemoine in 1922, it has been widely accepted as one of the finest double varieties.

One of the few articles that Mr. Havemeyer ever published came as the result of his visit to Lemoine. In it he told of Lemoine's great work in lilac breeding.

By 1915, Mr. Havemeyer was making lilac crosses and growing his own seedlings. They began to flower early in the 1920's. One of his first seedlings was a single reddish purple, which today is recognized as one of the finest of its color. He named it Mrs. W. E. Marshall, for the wife of his friend, the New York lily specialist. It was not a large flower, and he often expressed to me regret that he had not waited to put this name on a plant which bore larger spikes and larger individual flowers. I always told him that I disagreed with him, that this was a fine variety which would long remain popular and one of which he should be proud, even if it was not of top size.

His later varieties, however, were much larger in flower. The largest of all was Glory. I can remember that about 1922, when he first showed it to me, he took from his pocketbook what he called a luck piece — a twenty dollar gold piece (the like of which I had never seen before or since!) and it just covered one single flower of the larger spike. Now after thirty years, Glory is still the largest-flowered lilac I know, in fact, it is often so big that the weight of the flower bends the stem over. For this reason, I personally prefer the smaller, but still very large variety, Priscilla, which he named for one of his nieces.

One of the deepest single purples he named Sarah Sands, for Mrs. Havemeyer's sister. A very late blooming purple which has won great acclaim, is Night.

At Ewing Park, Des Moines, the variety which has attracted the most attention is Mr. Havemeyer's variety, Charm. Indeed, it might be said that this great lilac collection owes its beginning to him, because it was a collection of his seedlings sent to Miss Vivian Evans of Van Meter, Iowa, which so aroused her enthusiasm that she showed them to members of the Des Moines Garden Club. They in turn were so enthusiastic that they persuaded the Park authorities to devote a special garden to them.

I first met Mr. Havemeyer, not because of his lilacs, but because of his interest in iris. It was just before the organization meeting of the American Iris Society at The New York Botanical Garden in January 1920. The small committee, which was arranging for the meeting, felt that Mr. Havemeyer would make the best possible president and I was sent to his office in downtown New York to ask him to accept this position. He did a great deal to help the new society, but quite firmly declined to accept any official position.

My first visit to the Havemeyer garden was late in May, 1920. On the day he chose there was a heavy downpour of rain just as I arrived at his home. I can remember Mrs. Havemeyer's gales of laughter, when Mr. Havemeyer and I proceeded to go out in the rain to look at flowers. She was sure we were both crazy and said so quite loudly. She never forgot the incident and laughed about it almost every time I saw her afterwards.

For many years I went to Brookville nearly every year at lilac time. It was there that I first saw the newest varieties and listened to his remarks

about them. In his extreme modesty, Mr. Havemeyer hesitated to make his own final judgment, but he would quote what Prof. Sargent or E. H. Wilson had said about them, always ending with the caution not to make any final decision about one variety until it had been grown and judged for ten years. He was willing to name only a very few of his many seedlings. I have mentioned a few of those that have made lilac history in this country. Many others, some thirty in all, were named after his death and have not yet been widely distributed.

Mr. Havemeyer's last years were tragic. He suffered a paralytic stroke and for a long time was helpless. He never recovered the power of speech, but after two years was able to walk enough to go into the lilac fields to point out seedlings he thought had special merit. Mrs. Havemeyer and Alexander Michie, his superintendent, would suggest names and he would nod approval or violently shake his head in disapproval. Courageous and cheerful throughout his illness, he maintained his interest in lilacs to the last and enjoyed having visitors who talked to him about his flowers.

In his modesty, Mr. Havemeyer would not have wanted any monument or tablet or even a mention of his name. I know, however, that he would have been greatly pleased that plants from his collection should have a permanent home at The New York Botanical Garden, where they can be seen by tens of thousands of people, in contrast to the mere hundreds who used to visit his garden on Long Island.

The above address was given at the unveiling of a tablet at the Havemeyer Lilac Garden in The New York Botanical Garden.

TRANSPLANTING (from page 146)

them in thin muddy mixtures are practised to good effect. In planting, the roots are spread evenly and the soil worked among them, then the soil is tamped or trampled firmly and thoroughly soaked.

Larger, more mature trees and shrubs, both deciduous and evergreen, are moved more successfully if taken with a ball. This means that a trench is dug around the tree or shrub to be moved, the distance from the trunk varying according to the age and nature of the subject. The ball of soil is undermined somewhat so that burlap or canvas may be placed about the whole of the ball, which is then bound securely and firmly with rope. The object, of course, is to hold the ball intact during the moving operation to another position.

The hole to receive the tree or bush should be dug in advance, about the same depth as the ball of soil, and not less than two feet greater in diameter. The best possible soil should be used for refilling the hole, tamping as the job proceeds and finally soaking with water. If the tree is large enough to be swayed by winds, guy wires will be necessary and should be placed in position immediately. The finished level of the old ball should be slightly lower than the surrounding soil, not greater than an inch or so.

Except in emergencies, the moving of large trees is undertaken while growth is inactive, preferably in the spring or fall. Special attention should

be paid to lessen the shock of moving and to hasten recovery. This may take the form of overhead spraying or the entire coating of dormant deciduous trees with a wax preparation to reduce transpiration. Should a tree be moved from a shady spot to a sunny position or a tree be turned so that the side of its trunk that was formerly in shade is now exposed to the sun, it helps considerably to wrap the trunk with burlap or heavy paper. This applies to young and smooth-barked trees, dogwoods and the like.

General Remarks

Certain small plants commonly grown as ornamentals or as vegetables are averse to transplanting; their roots resent being disturbed. This difficulty may be overcome, of course, either by sowing seeds where the plants are to remain and mature or by sowing seeds in pots and transplanting from the pots with the ball intact, not even removing drainage material enclosed by the roots. Examples are peas, both culinary and sweet, lupins, mignonette, poppies, particularly the annual and hunnemannia, and *Phlox Drummondi*. Among the larger subjects which are difficult to transplant, unless removed with a large ball, are cotoneasters, sumac, and cotinus.

The question is frequently raised as to the merits of spring planting over fall, or vice versa. In the majority of cases, I think spring planting is to be preferred. Usually, the plants about which the question arises are somewhat tender, and it is really the problem of their surviving the first winter — in which case it is better to defer transplanting till spring. However, if the questionable ones are moved relatively early in the fall, while the ground is still warm and root action able to continue for a while, there is not too much risk. Based on my own experience, I would not move hemlock in the fall but in the late spring. Late spring moving goes for any of the evergreen conifers. *Abies concolor,* so I have found, invariably dies if fall moved and this is particularly true of good-sized trees. Deciduous material generally, especially in small sizes, transplants well in the fall.

Mulching, particularly for autumn transplantings, is beneficial. The mulch may take the form of spent manure, compost, leafmold, peat moss, and so forth, applied to a depth of six inches. It may be supplemented later, when winter proper has set in, by an additional covering of litter. Precaution must be taken, however, against mice which may use this cover for winter quarters. Frequently these rodents do much harm by feeding on the bark.

Frequent reference has been made in the foregoing notes about watering thoroughly after transplanting, the purpose being to settle new soil about the roots and to provide the necessary moisture to keep the plant turgid. This does not mean that the newly-moved subject is to be kept incessantly sodden about the roots. In my opinion, quite a number of sizable trees and shrubs are killed as the result of too much watering, for it cuts off the air supply and the young roots are thus killed. Water carefully and mulch to prevent too rapid evaporation.

CHRYSANTHEMUMS (from page 138)

Pompon and garden varieties are left to develop without any further pruning or disbudding. Standards, incurves, and disbudded singles, anemones and disbudded poms require additional attention. The growth at the axil of the leaves should be removed as soon as possible. This is best done in the morning while the plants are still turgid. When the terminal cluster develops, don't be in too much of a hurry to remove the unwanted buds. Give them a chance to develop so as to make sure of selecting the best bud.

Spraying for diseases and insects is a prevention rather than a cure. Parzate at the rate of one ounce to four gallons of water is effective in cases of mildew, rust, and leaf spot. Nicotine sulphate will take care of aphids. A good combination spray: Water, three gallons; Dreft or any detergent, one teaspoon; Parzate, two tablespoons; Deenate 50W, one and one-half tablespoons; Parathion, two teaspoons. First, measure out the spreader and dilute in small amount of water. Second, fill the tank with the required amount of water, add the diluted spreader and stir. Third, take out a small amount in a jar, add Parzate and shake well until the powder is thoroughly wetted; then pour back into tank through a fine screen or mesh. The same is done with Deenate 50W and Parathion. The regular use of the above spray will aid in keeping the plants free from diseases and insects.

For the author who grows a large number of mums with different blooming dates, shading seems to have no particular advantage. If varieties with the same blooming dates are used, then shading does have some use. However, enough mums with early blooming dates are now on the market to enable one to have blooms for exhibition without shading.

It is a wise procedure, however, to put up a frame over the beds to give temporary protection against rain and frost. Light canvas, glass substitute, or black sateen cloth, used for the purpose of shading, are all excellent protectors against the wiles of late October and early November. It is possible to have blooms until Thanksgiving with such protection.

In cutting the blooms for exhibition, it is recommended that the blooms be cut the morning before the day of the show. Read the rules of show schedules very carefully, then start cutting. Always cut extra blooms to allow for accidents. The blooms should be submerged almost to their necks in cold water and kept in a cool, draft-free place. By the morning of the show they will be well cured and will stand up well for judging.

THE FOOD PROBLEM (from page 153)

into focus many purely scientific problems which must be solved in order that the engineering features can be put on a sound basis. It has been the experience in almost all industrial applications of scientific discovery that at the outset a host of new scientific problems come into being. The industrial culture of algae has been no exception. Consequently, much purely scientific research is still in progress, and many important improvements in the process may be expected. The directions in which improvements may be expected are the design of the growth chambers for the most effective use of sunlight, the selection of strains of algae capable of utilizing higher light intensities and higher temperatures, and different sources of fixed nitrogen nutrients.

In an effort to solve the engineering problems inherent in the process, two investigations have been undertaken on a pilot-plant scale; the first by the Stanford Research Institute, in California, and the other by Arthur D. Little, Inc., in Cambridge, Mass. The latter plant represented a tremendous increase in size and amount of product obtained over anything which has heretofore been attempted. With small-scale laboratory equipment an average yield of eleven grams dry chlorella per square meter per day, corresponding to one hundred pounds per acre of culture area per day, has been repeatedly obtained by various methods and by different workers. This yield has been substantiated through the operation of the pilot plants, and it is estimated that with the improvements in operation resulting from the experience gained with pilot plants, the yield may be doubled or even further enhanced. It is clear that larger installations can operate more efficiently than small ones. At any rate, it is certain that algal culture, with a view to producing food or other organic materials is not suitable for small-scale operation such as might be carried out as an adjunct to a garden. It would have to be an "industrial farm." Based upon the conservative yield of one hundred pounds of dry chlorella per acre per day, the normal growing period of one hundred twenty days should yield about six tons per acre. For practical purposes this may be compared, for example, with the one-half ton of soy beans obtained per acre per year in modern agriculture.

The potential use of algae grown as an industrial product would be as human food in areas of great food demand, as animal feed, and as a source of important industrial raw materials. There is no obvious reason why chlorella should not serve as a food-stuff; it has no disagreeable taste, is rather bland in flavor, and mixed with other food-stuffs has produced acceptable fare. It is of value under present world food conditions, particularly because of its high protein content. Analyses show the presence of all of the ten so-called essential amino acids in favorable comparison with many vegetable sources of proteins. The fats of chlorella are notable for their high degree of unsaturation. All the important vitamins are known to be present in chlorella at reasonably high levels and it has an unusually high chlorophyll content. More exhaustive animal feeding tests are, of course, required.

The development of the large-scale culture of algae has not progressed sufficiently to permit an accurate cost estimate to be made at the present time. There are, moreover, in such an undertaking so many intangibles and variables that it seems doubtful whether a conventional dollar cost analysis should at the present stage be stressed. The need of the world for sources of protein and fats is so great, especially in the densely populated areas, that any promising means which have survival value are worthy of investigation. The peace of the world demands a broad outlook on this pressing problem. It is particularly a challenge to this country, which still has the means and the heart to employ its technological and scientific skills for the welfare of humanity and world peace.

For the Younger Generation of Gardeners

Square Meals from Round Berries

By **Margaret McKenny**

A GARDEN should contain more than flowers. The gleaming wings and joyful song of birds should give it happy life. But to have birds in the garden we have to plant trees and shrubs which bear fruits to attract the birds and insure them an abundance of square meals.

We must also give birds protection from their enemies and safe places to nest. You know, of course, that the pet cat you love so dearly is one of the enemies of birds. A vine-covered fence makes grand cover and provides sheltered nesting places. You will find that bittersweet which you have probably noticed — and may even have picked it because of its orange-red fruit for an autumn bouquet while on a Scout hike — will quickly grow over a fence. Japanese honeysuckle is another fast growing vine, but remind Dad that he will have to watch both bittersweet and Japanese honeysuckle and keep them within bounds, for they often escape and choke out more desirable plants.

If your home is in the country where you can plant red-cedars, they make a very valuable shelter for birds. The closely set branches protect them from snow and the blue berries furnish food for many different kinds of birds.

The gracious hemlock is another evergreen you can suggest to your parents that they plant for protective cover for birds; and if they place a flowering dogwood in front of the hemlock, this will make a pretty garden picture and at the same time the red fruits which follow the showy white flowers on the dogwoods will be eaten by a host of birds. There are other members of the dogwood family that add pretty flowers to the garden and produce berries for the birds. Among them are Cornelian cherry, *Cornus mas,* and the Pagoda dogwood, *C. alternifolia.* The latter has small white flowers and red-stemmed blue berries which are soon spied by the birds.

Maybe you have heard of elderberry jelly and elderberry wine. Well! the dark blue berries from which delicious jelly and wine are made offer a glorious feast to one hundred or more different kinds of birds. The elderberry has pretty, foamy white flowers and rather lacy leaves. A tree which makes a pleasing companion to the elderberry shrub is the American mountain-ash. Its scarlet berries attract not only robins and cedar waxwings but such seldom seen bird visitors as the pine grosbeaks. By the way, the elderberry can take hold more ground than Dad may wish to give it — so he ought to be careful where he plants it.

Several of the viburnums bear fruits that stay long on the bushes and so give food to winter-hungry bird migrants. The translucent red berries of the native *V. trilobum* cling to it for months, making a vivid contrast in color to the drifting snow on a December day. After Jack Frost has softened the berries, you will have the fun of watching a flock of cedar waxwings feed on them while lisping their thanks as they feast. Another beautiful member of the viburnum tribe is the nanny-berry — and how the birds enjoy its striking mixture of chartreuse, rose, rose-purple and deep blue fruits. Have you ever seen the lovely shadbush? If you have taken a walk in early spring I am sure you have, for the snow-white flowers which wreath its slender branches and open in advance of or as the leaves unfurl, make the shadbush one of the most conspicuous of the small trees of our eastern countryside. The small apple-like fruits ripen early and give a banquet to flickers, orioles, robins, veeries and downy woodpeckers. The early-ripening fruit is a great boon to anxious mother birds which are looking for juicy food for their nestlings.

The highbush blueberry combines its plentiful supply of luscious berries for hungry young birds with vivid rose-red and purple autumn foliage, and its clusters of tiny urn-shaped creamy to pinkish flowers are attractive, too, in spring. The highbush blueberry is an ornamental addition to any shrub border. Maybe if you tell this to Mom and Dad, you can prevail upon them to plant the highbush blueberry around your home grounds to attract some bird friends. Perhaps you can also prevail upon them to plant the shadbush or the viburnums or the elderberry on your home grounds, too.

Several low-growing plants or groundcovers, as they are called, provide hearty meals for bird visitors in the cold months of the year. The partridge-berry with its tiny two-eyed red berries and the wintergreen with its spicy red fruit will grow in the shade of hemlock. You will often see fox sparrows digging through the snow to excavate these round berries for their square meals in winter.

Year by year a planting of the kinds of trees and shrubs mentioned here will grow more and more beautiful, and year by year you will notice new visitors coming to your garden, for birds bring birds by a kind of wireless communication. The usual dooryard birds such as song sparrows, juncos and chickadees will always be with you and seeing them around your trees and shrubs, other interesting and rare birds will begin to visit you, too. Some day a flock of evening grosbeaks, like autumn leaves blown by the wind, will descend upon your garden, or perhaps a mocking bird or cardinal will find your shrubbery-bordered yard a safe, year-round haven.

BOOK REVIEWS

PLANTS FOR MAN. Robert W. Schery. 564 pages, illustrated, indexed. Prentice-Hall, New York. 1952. $7.50.

This is one of the most readable texts on the subject of the plants used by man which this reviewer has had the pleasure of examining. It is not mere economic botany compiled in a coldly factual manner, but pleasingly underlines man's dependence upon the plant world. While the author states in the preface that "No one volume — no one lifetime — is sufficient to discuss all the ramifications that might arise from a discussion of plant products," he very nearly accomplishes just such a goal.

The volume is divided into four major subdivisions: Part I — Introduction, in which man's dependence upon and economic interest in plants is presented; Part II — Products from the plant cell wall, wherein all aspects of forestry, forest products, distribution of forests of the world, the nature of woods, and fibers are treated; Part III — Cell exudates and extractions, which embraces discussions of latex products, gums, resins, tannins, dyes, perfumery, medicinals, sugars, etc.; and Part IV — Plants and plant parts used primarily for food and beverage. Chapter 21 of the latter part treats of microorganisms which are important to the well-being of mankind.

A good example of the thorough treatment of one of these subjects is found in Chapter 8 on latex products. The introductory paragraph deals with the nature of latex, the families including lactiferous plants and the distribution of such plants. The most important latex product which Dr. Schery treats is rubber, and he devotes ten pages to the discussion of the pará type. He first considers the history of the use of this material and relates the story of the culture of *Hevea brasiliensis,* the euphorbiaceous tree which produces the pará rubber. The next four pages are devoted to a very interesting account of the minutae concerned with the tapping, collection, and processing of the latex, both by primitive peoples and by modern methods. In the section entitled "The Rubber Industry," Dr. Schery discusses the economic and social aspects of the industry since before the last war and up to the present time, including a consideration of the nature, production, and effect on natural rubber production of synthetic rubber. Even a description of the manufacture of pneumatic tires from raw rubber to the finished product is included in this latter section. The last eight pages of the chapter are devoted to a summary of the various aspects of rubber production from plants of lesser importance.

This is not an atypical example of the breadth of viewpoint taken throughout this book, but one selected at random as thoroughly representative. Each section is profusely illustrated and the text is so well written that it makes interesting reading for laymen and botanists alike. It is considered by this reviewer to be an indispensable addition to any library as an excellent source book, and as a text for a course in economic botany it is admirably suited.

RICHARD S. COWAN

SOIL DEVELOPMENT. Edward H. Faulkner. 232 pages. University of Oklahoma Press, Norman. 1952. $3.

Income from the sale of three hundred forty thousand copies of PLOWMAN'S FOLLY made it possible for the author to devote more time to travel, reading, and experimentation in preparation for the publication of three additional books, of which this is the latest. In this book he develops the thesis that it is not necessary to use lime, fertilizer, compost, or any other soil amendment, save the refuse of crops and cover crops. These crop wastes are worked into the surface soil rather than being plowed under. During the first four years of this program on his experimental farm, the crops were not impressive, and considerable trouble was experienced with insects and diseases. In the fifth year, however, tomatoes yielded at the rate of twenty-one tons an acre and excellent results were had with head lettuce. Mexican bean beetles passed him by in favor of his neighbors.

The author does not advise against the use of fertilizers. Rather, he suggests that the farmers would do well to use them while bridging the gap between plow-plus-mineral economy and that of the toolbar cultivator-plus-crop refuse. When this change has finally been effected, crop yields, he believes, will be higher and food will be better and cheaper.

What the author is advocating, in effect, is a return to peasant farming. The peasant, who operates on a relatively small scale and with much hand labor, can take greater advantage of the natural mineral resources of his soil and subsoil than can the large farmer. More organic refuse can be saved and worked into the soil and acre yields can gradually be stepped up. If he follows a livestock system of farming and returns, in the form of manure, the major part of the mineral elements his crops removed from the soil, his yields can often be maintained at fairly high levels without supplemental use of fertilizers.

Possibly the author's concepts grew out of his humble origin as a product of a twenty-nine acre farm in the Kentucky mountain area, where his father was a market gardener. His father used fertilizers. But the son would have us return to the simpler ways of his forefathers, whose honest toil was rewarded with good appetites that were abundantly satisfied by the more nutritious and tasteful products that went from the then near-to-Nature soil directly to the farm table.

That the author's seven years of experience on his literary by-product Ohio farm provides sufficient evidence to permit of widespread acceptance of his concepts as the basis for a national program for food production seems very doubtful, to say the least. But he insists that his readers bring pressure to bear on the agricultural experiment stations to the end that they set aside their present research programs on what he would call the "chemical" approach to agricultural production. He thinks it important that there be a return to what he believes is Nature's way of growing plants.

The book is interesting. The author carries on intermittent conversations with his neighbor, Zeb Turner, also from Kentucky. Some of the ideas expressed by these two men are very good, others are highly doubtful, and still others border on the "crackpot." One has the impression that the author has a suppressed desire to deal a deathblow to all scientific concepts that do not conform to his thinking, and to scientists as well.

FIRMAN E. BEAR, *Chairman*
Soils Department
Rutgers University

THE CHEMISTRY AND ACTION OF INSECTICIDES. Harold H. Shepard. 504 pages, illustrated, indexed. McGraw-Hill, New York. 1951. $7.

This book is a complete revision of Dr. Shepard's CHEMISTRY AND TOXICOLOGY OF INSECTICIDES, issued in mimeographed form in 1939. This was the first complete treatise on the subject and has had a strong influence on the development of insecticides since its publication. The present volume attempts to bring the subject up to date. Almost one-fourth of the text is devoted to a discussion of inorganic compounds, and about half to the organic insecticides. Major emphasis is given the more important insecticides, and there is brief mention of literally dozens of less important materials, including solvents, emulsifiers, and adhesives.

A thorough study of the subject makes it obvious that the mass of materials published during the last decade is too large to be digested thoroughly in a book of this scope and size. This is true particularly of relative toxicity, mode of action, development of resistance to insecticides and synergism. It seems rather strange, too, to see these general subjects relegated "to the back of the book" rather than placed in an introductory position.

This should be a good text book for advanced students, and a valuable reference book for information on insecticides and related materials.

NEELY TURNER
The Connecticut Agricultural Experiment Station

ECONOMIC BOTANY. Albert F. Hill. 560 pages, illustrations, bibliography, index. McGraw-Hill, New York. Second edition, 1952. $7.

The oneness of today's world reflects itself in the tendency in our Liberal Arts colleges to integrate the sciences and eliminate the false boundary between pure and applied science. Hill's book emphasizes this objective for botanical science. Botany touches our individual lives daily in so many innumerable ways that an appreciation of what these contacts are, gives the subject cultural as well as scientific value. This new edition should serve admirably as required reading in general botany and general biology and in courses in economic geography and general economics, as well as a textbook for a separate half-year course limited to economic botany. It broadens the intellectual horizon and interests of the student and

results not only in the acquisition of scientific factual knowledge but also improves the training for life in modern society.

The twenty-one chapters survey the importance of plant products to man and deal specifically with industrial plants, food and spice plants, drug plants, and beverages. The presentation is adapted to the college level, is informative, stimulating, and avoids the detailed technicalities of monographic treatments. Botanically and statistically accurate in general, there are a few exceptions such as the statement on page 469 that there are twenty-five species of coffee, including three economically important ones. May the reviewer call attention to the fact that there are approximately forty species, nineteen being utilized as a beverage source in various areas of the world, although only three reach commercial trade channels in significant quantities.

The line drawings are excellent, and the text is abundantly illustrated with two hundred figures of interesting photographic material. These are original or well selected in subject matter from other texts. They are all serviceably clear, but a considerable number suffer, unfortunately, either from prints not being of the highest quality or having lost some definition in the process of reproduction. The appendix includes an excellent bibliography since 1936. For students who wish to read beyond the text, a few classical monographs on major economic plants might have been added to advantage from earlier publications. The text has been brought up-to-date, especially in the sources of antibiotics and other medicinals such as cortisone; and, in the revision of the chapter on rubber. The listing of movie and film strips available and the sources of such visual education aids should prove exceedingly useful to the classroom instruction.

RALPH HOLT CHENEY
Professor of Biology
Brooklyn College

ANYONE CAN GROW ROSES. Cynthia Westcott. 147 pages, illustrations, bibliography, index. D. Van Nostrand, New York. 1952. $2.

An experienced gardener, lecture-traveler, and plant scientist, the author of this comfortably sized volume indicates in the foreword her outreaching desire to share with others the pleasures of rose growing. Under ten italicized subject headings, simple instruction is given for usual rose culture; e.g., common sense is suggested in the explanation of the much debated topic of spring pruning as being dependent upon climate and plant conditions as much as upon desire or purpose.

Her concise descriptions of varieties are certain to be preferred to some commercial ones. The descriptive list of two hundred thirty-five varieties may seem rather long, but each has been or is a favorite somewhere — although the reader-buyer may search widely to find a few of them. It may be questioned if some will distinguish by class an "ever-blooming climber" from an ever-blooming "climbing hybrid tea." But that is a well intended nicety not yet entirely settled by rose societies and officials.

The charts and drawings of certain insects and diseases are so much more valuable than word descriptions. However, it is a little disconcerting to find fifty of the one hundred thirty-eight pages of text devoted to insects, diseases, and other enemies of roses, ninety-nine in number not including errant dogs and inept journeyman gardeners. It is consoling to be assured that not all are common in any region. Nationwide interest is maintained by this extensive list in which the "Plant Doctor" has specified cures for many an ailing garden.

E. A. PIESTER, *Curator*
Elizabeth Park Rose Garden
Hartford, Conn.

HOW TO GROW RARE GREENHOUSE PLANTS. Ernest Chabot. 182 pages, illustrated, indexed. M. Barrows & Co., New York. 1952. $4.

First one must get the rare plant, and no safari would yield more adventure than the catalogs of the forty sources named, located mostly in the South and West.

Next, one must conquer pests, and this chapter is most up-to-date, though somewhat forbiddingly fluent regarding gas masks and the like.

The selection of two hundred and sixty varieties from the entire cultivated and (more or less) tender flora is uneven and difficult to explain and, in fact, to reconcile with the title, "rare plants." However, most of the popular favorites of porch, sunroom, and amateur greenhouse are there, generally correctly named.

Since this information must otherwise be sought through many catalogs and several massive works not usually in the amateur's library, this book will be welcomed by many.

VICTOR GREIFF
Neponsit, Queens, N. Y

JOHN BURROUGHS' AMERICA. Edited by Farida A. Wiley. 304 pages, illustrations by Francis Lee Jaques; indexed. Devin-Adair, New York. 1951. $4.

These selections from the writings of John Burroughs are sermons in serenity; and Francis Lee Jaques' incomparable black-and-white illustrations further enhance these classic notes of the great Hudson River naturalist and philosopher. Burroughs found his loved countryside an inexhaustible source for endless study and meditation. It was an absorbing passion with him, and in his daily journeys through the fields and woodlands he was filled with the joy of fresh discoveries.

With Mrs. Wiley's selections, we circle the year and can anticipate and relish the wonders of the four seasons as the planet swings our way. Students of bird life can echo his theory that its "fascination is overpowering" and that it "fits so well with other things."

The chapter entitled "Straight Seeing and Thinking" should be read by teachers and publishers alike. Burroughs declares, through this chapter, there is never justification for falsifying the facts of nature to make a book entertaining. To him "books, friends and nature" were to be cherished for the treasures they gave him. He believed Americans had yet to learn to enjoy life "in a low key"— that they always expected (as today) "rapid and extraordinary returns." And above all, Burroughs found perfection in solitude.

WINIFRED FERRY BOWER
New Vernon, N. J.

GENERAL HORTICULTURE. James Sheldon Shoemaker. 464 pages, illustrated, indexed. J. B. Lippincott, Philadelphia, Pa. 1952. $6.

Probably we need more new books on this general subject of elements of horticulture, for new recruits for the "green thumb" brigade are forever appearing. This book differs from most textbooks, as it has a dozen questions at the end of each chapter, with a bibliography of books for further reading. It should be required study for all horticultural chairmen of garden clubs. It could be used as an outline for study at meetings. If a garden club member can answer fully and intelligently all the review questions of each chapter, from the data in the text, she rates A for effort! Some of the questions stump this reviewer, for in so vast a subject as horticulture new and more definite terms are always appearing.

Yet the book is full of practical details, as the fact that Bing cherry has no hairs on the leaf petiole. There are omissions, as there is nothing on the use of colchicine and other chemicals, little on the value of hormones and how they stimulate root growth,

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nothing on genes and but little on chromosomes, and such special tricks of training as inarching, espalier, or Japanese training of plants. Perhaps these are too far advanced for the first year of study. Emphasis is on pomology, market-garden, nursery practice and general large-scale operations, and less on the home garden of purely ornamental plants. But the tricks of this trade are well represented. The illustrations are well chosen and very helpful.

STEPHEN F. HAMBLIN
Lexington Botanic Garden
Lexington, Mass.

FLOWER GARDEN GUIDE. Thomas H. Everett. 144 pages, illustrated. Fawcett Publications, New York. 1952. 75¢.

FLOWER GARDEN GUIDE by T. H. Everett is profusely illustrated both by photographs and line drawings. In fact, the publication might be titled "A Garden Look." The text, directed to the average home gardener, first deals in detail with types of garden soil and how to improve them.

There are chapters with useful instructions on Flower Beds for Spring and Flower Beds for Summer; Water in Your Garden; Vines for Covering Walls and Trellises; Flowers for Window and Porch Boxes; and an excellent discussion of City Gardens.

Besides chapters on all our most popular flowers, describing in detail their cultural requirements, there is a comprehensive list of garden plants of every kind, each one illustrated.

JAMES G. ESSON
Great Neck, N. Y.

THE ART OF DRIFTWOOD AND DRIED ARRANGEMENTS. Tatsuo Ishimoto. 143 pages, illustrated with 130 photographs. Crown Publishers, New York. 1951. $2.95.

The fact that this book soon sold out the entire first edition proves that the subject is popular. The author has obviously written for the beginner who wishes to learn how to go about creating a composition in this comparatively new field.

The advanced student of arrangements, aware of the essential principles of the art, cannot always agree with the author who says, "In arranging, the most important of all rules is found in the answer to the question, 'Is it interesting?' If it is, you can forget all the rest." As a result, in too many cases there are poor spacing of materials, lack of a focal point, confused rhythm, and no relationship between the line established by the wood and the dry material used with it.

Beginners will be interested in the author's use of masonite as a base. His best work is found in compositions where wood alone is present. In others there is often a disregard of ecology — fawns are likely to be resting in trees!

The many photographs with a clear explanation of each step in a design are valuable.

NAIDA GILMORE HAYES
Berkeley, Calif.

THE PRINCIPLES OF GENERAL BIOLOGY. Mary S. Gardiner. 657 pages, illustrated, indexed. Macmillan, New York. 1952. $5.25.

This book is not intended as a day-by-day text book, but as a supplement to classroom and laboratory instruction for the student taking a course in biology. However, it will also be appreciated by other than students in biology, by those who desire to acquire some knowledge of this field in order to gain a better understanding of the world in which we live.

Chapters of particular interest to such readers occur in the second section in which the organization of living things — of plants and animals — are treated comparatively. Chapters in the third section on growth and regeneration, gametic reproduction and the inheritance and development of the individual are also stimulating.

(Continued on page 163)

RECENT ACQUISITIONS TO THE LIBRARY

BACKGROUND OF PLANT ECOLOGY, by H. S. Conard. Ames, Iowa, Iowa State College Press, 1951. $5.00.

HANDBOOK OF MUSHROOM CULTURE; 2d ed.; by A. M. Kligman. Kennett Square, Pa., J. B. Swayne, 1950. $4.00.

MUSHROOM GROWING TODAY, by F. C. Atkins. N. Y., Macmillan Co., 1950. $2.50.

THE CACTI OF ARIZONA; 2d ed.; by Lyman Benson. Albuquerque, University of New Mexico Press, 1950. $4.00.

SHRUBS OF MICHIGAN; 2d ed.; by Cecil Billington. Bloomfield Hills, Michigan, Cranbrook Institute of Science, 1949. $4.50.

PROGRESS IN BIOCHEMISTRY, by Felix Haurowitz. N. Y., Interscience Publishers, 1950. $7.50.

INTRODUCTION TO MICROORGANISMS; 2d ed.; by LaVerne Ruth Thompson. Philadelphia, W. B. Saunders Co., 1949. $4.25.

FIFTY YEARS OF PLANT PHYSIOLOGY, by Th. Weevers. Waltham, Massachusetts, Chronica Botanica Co., 1949. $5.00.

FLOWERS. A Guide to American Wildflowers, by Herbert S. Zim and A. C. Martin. N. Y., Simon and Schuster, 1950. $1.00.

FIELDBOOK OF NATURE ACTIVITIES, by W. Hillcourt. N. Y., G. P. Putnam's Sons, 1950. $3.95.

A FIELD GUIDE TO THE BUTTERFLIES, by Alexander B. Klotts. Boston, Houghton Mifflin Co., 1951. $3.75.

TRACE ELEMENTS IN PLANTS AND ANIMALS; 2d ed.; by W. Stiles. N. Y., Macmillan Co., 1951. $3.00 (re-issue).

BIRDS, by Herbert S. Zim and Ira Gabrielson. N. Y., Simon and Schuster, 1949. $1.00.

THE CAMELLIA, by G. B. Tirocco. Los Angeles, The Walden Press, 1949. $3.00.

THE PRUNING BOOK

Advice on pruning fruit and ornamental trees, shrubs, hedges, evergreens.

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Assistant Curator of The New York Botanical Garden

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1001 GARDEN QUESTIONS ANSWERED; 4th ed.; by A. C. Hottes. N. Y., A. T. de la Mare Co., 1951. $5.00.

BIOLOGIA: An International Year-Book Devoted to the Pure and Applied Plant and Animal Sciences, Volume 2, 1950/51. Waltham, Mass., Chronica Botanica, 1951. $4.75.

GRASSES OF WISCONSIN, by Norman C. Fassett. Madison, Wis., University of Wisconsin Press, 1951. $3.00.

A MANUAL OF THE MOSSES OF WESTERN PENNSYLVANIA AND ADJACENT REGIONS; 2d ed.; by O. E. Jennings. Notre Dame, Ind., University of Notre Dame Press, 1951. $4.25.

THE HERB GROWER'S COMPLETE GUIDE; rev. ed.; by Rosella F. Mathieu. Cincinnati, Fragrant Herb Farm, 1951. $2.25.

JAPANESE GARDENS, by Matsunosuke Tatsui. S. Pasadena, Cal., Perkins Oriental Books, 1949. $1.25.

THE WILLIAMSBURG CALENDAR FOR ENGAGEMENTS AND ALMANACK FOR THE YEAR OF OUR LORD 1952. Williamsburg, Virginia. $1.25.

GREEN FINGERS AND OTHER POEMS, by Reginald Arkell. N. Y., Harcourt, Brace and Co., 1952. $2.00.

BETTER HOMES AND GARDENS GARDEN BOOK. Des Moines, Iowa, Meredith Publishing Co., 1951. $3.95.

FRENCH-ENGLISH SCIENCE DICTIONARY; 2d ed.; by Louis DeVries. N. Y., McGraw-Hill Book Co., 1951. $6.50.

THE CHEMISTRY AND TECHNOLOGY OF FOOD AND FOOD PRODUCTS, edited by Morris B. Jacobs, 2d rev., ed., Volume 3, N. Y., Interscience Publishers, 1951. $15.00.

JAN INGEHOUSZ, PLANT PHYSIOLOGIST, by Howard S. Reed. Waltham, Mass., Chronica Botanica Co., 1949. $3.00.

BOTANICAL MICROTECHNIQUE; 2d ed.; by John E. Sass. Ames, Iowa State College Press, 1951. $3.50.

TAXONOMY OF VASCULAR PLANTS, by George H. M. Lawrence. N. Y., Macmillan Co., 1951. $7.95.

FLOWER MAKING, by Clara Kebell. N. Y., Studio Publications, T. Y. Crowell Co., 1951. $1.50.

HOW TO GROW BETTER HOUSE PLANTS, by Esther C. Grayson. Copley, Ohio, Hydroponic Chemical Co., 1952. $1.00.

GARDENING HANDBOOK, by T. H. Everett. N. Y., Sterling Publishing Co., 1952. $2.50.

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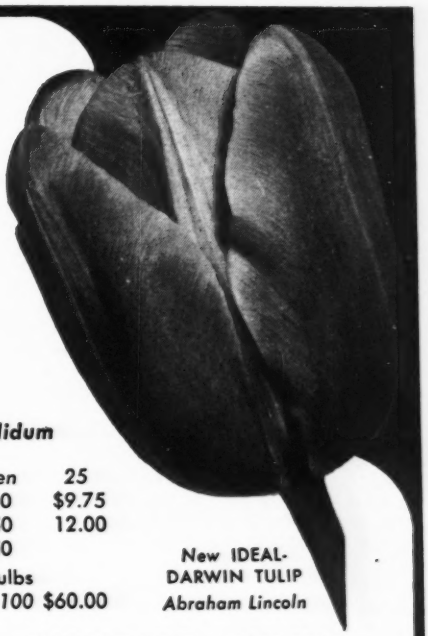

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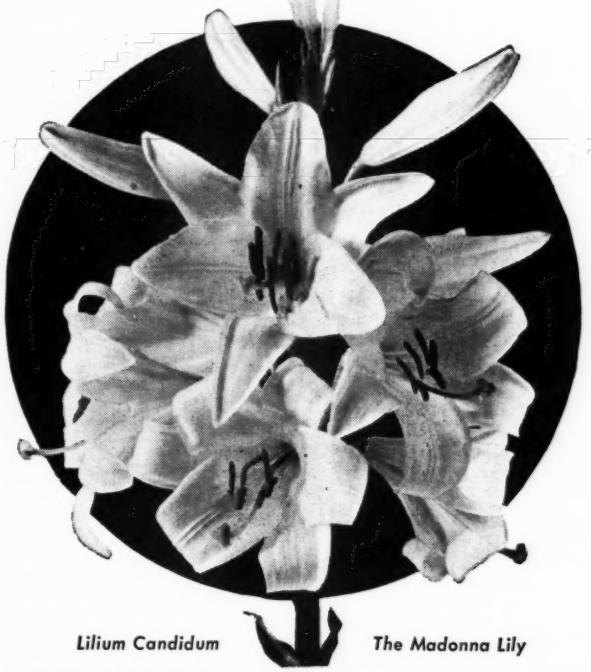

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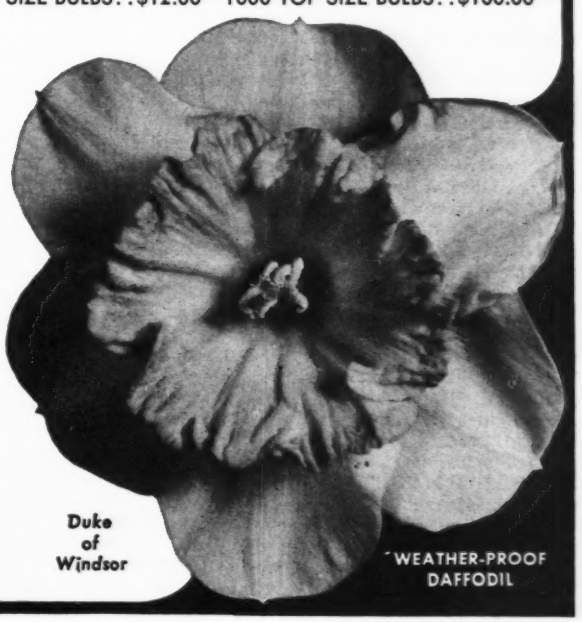

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Wayside Gardens

Zonal Geraniums

Complying with the many requests for a descriptive list of the zonal geraniums in the exhibit of The New York Botanical Garden at the International Flower Show in New York City, March 1952, we present the following, the data for which was compiled by Miss Ruth V. Caviston from the catalogs and books of such well-known geranium specialists as Carlton Villa, John E. Cross, Logee's North Street Greenhouses, Holmes C. Miller, R. Vincent, Jr. & Sons Co., West Los Angeles Nursery, and Helen Van Pelt Wilson.

— The Editor.

ABBIE SCHAFER. Flowers soft crimson-scarlet. Excellent semi-dwarf habit. A variety that is good everywhere.

ALASKA. Flowers white-bordered orchid. Large floret and umbel.

ALICE LEMON. Flowers salmon-pink, white margined. Old French variety.

ALPHA. Flowers rich scarlet. The foliage is finely denticulated. The center of the leaf is greenish maize with a broad dark zone edged golden-yellow.

ANASTASIE LACADRE. Flowers bright crimson, white towards the center.

ANN SOTHERN. Flowers deep fuchsine pink, shading to white center.

ANNA BLUEDORN. Flowers rich crimson.

ANNE VINCENT. Flowers beautiful blend of pink, coral, salmon and white. An excellent pot plant.

APPLE BLOSSOM. Flowers red with white center.

AURORA. Flowers scarlet.

BEAUTE DE POITEVINE. Flowers salmon-pink. Strong bushy plant.

BEAUTY OF CHATSWORTH. Flowers with lower petals carmine, upper ones scarlet. Produces many seedlings.

BERKELEY BELLE. Flowers light red, shading to white center. Showy.

BLACK VESUVIUS. Flowers vermilion. Small leaves of dark olive color. Dwarf.

BLACK VESUVIUS RED. Flowers Dutch vermilion. Leaves spinach-green with irregular large center patterns of citron-green. Leaves curl upward in growth.

CHEERIO. Flowers cherry-scarlet with white center. Strong growing plant.

COLORADO AGGIES. Flowers scarlet to orange-scarlet.

CRABBE. Flowers salmon-coral.

DAWNFLUSH. Flowers white-veined and flushed with soft salmon. Flowers last exceptionally well.

DISPLAY. Flowers scarlet. Green leaves with wide edge of bright yellow and zoned with scarlet, crimson and brown.

DORIS KENYON. Flowers pale salmon flushed and veined pale rose, deeper in the center.

DOUBLE NEW LIFE. Flowers alternately rose-and-white-petaled. Free flowering; compact grower.

DOUBLE PINK BIRD'S EGG. Flowers orchid-pink with some white in the center. All petals, especially lower ones, spotted with small rose-red dots.

DOUBLE POINSETTIA. Flowers deep red with narrow, rolled and twisted petals. Slender stemmed and not very compact. Flowers freely.

DREAMS. Flowers soft salmon-coral. Flowers are large with a fine waxy quality.

DWARF GOLD LEAF. Flowers brilliant scarlet. Yellow to yellow-green leaves without any zone. Not truly dwarf but a compact, short-jointed plant.

E. H. TREGO. Flowers dazzling scarlet. The foliage is glossy green, with dark zone, large and of good texture; an excellent semi-dwarf, robust and branching.

EMILE ZOLA. Flowers soft apricot-salmon. Grow in part shade for good color.

ENCHANTRESS. Flowers salmon, deepening to red-salmon as they age.

FAIRYLAND. Flowers light scarlet. Small, dark, grayish green leaves with wide pale ivory border beautifully zoned with irregular splashes of rose-red. Dwarf.

FIAT. Flowers salmon-coral. One of the best plants for either pot or garden.

FIAT QUEEN. Flowers salmon-pink. Each petal of each flower very distinctly toothed around the edge. Very bushy and compact; free flowering.

FIAT SUPREME. Flowers salmon.

FLAME. Flowers brilliant red.

FLARE. Flowers salmon-coral to salmon-scarlet. Vigorous variety that flowers exceptionally well.

FRENCH BOUQUET. Flowers an odd slightly grayish-pale shrimp, slightly deeper in the center.

GERTRUDE PEARSON. Flowers deep clear pink with a white eye.

GLOIRE DE FRANCE. Flowers shrimp, shading to deeper center.

GOLDEN GATE. Flowers brassy orange.

HAASE SCARLET. Flowers bright red. The flowers burn badly and turn black in the center before the cluster fully opens. Large leaves, practically zoneless.

HAPPY THOUGHT. Flowers cerise-red. Very good light green leaves with irregular golden center surrounded by deep olive ring. The gold center resembles large yellow butterflies.

HELEN VAN PELT WILSON. Flowers lilac-white.

IGOR STRAVINSKI. Flowers delicate salmon-pink with white.

INDIAN SUMMER. Flowers soft apricot-orange with white center. Fine for cutting. Spectacular in artificial light.

INSPIRATION. Flowers cream flushed with light salmon or shrimp. Flowers excellent for bouquets and corsages.

JANE MAXWELL. Flowers scarlet. Green leaves edged bright yellow with strongly colored brown zone splashed with red.

JEANNE. Flowers white with pink blush.

JULES VASSEUR. Flowers red with white center.

KLEINER LIEBLING. Flowers rose-pink with white center. Dwarf; naturally very short and compact.

LADY DRYDEN. Flowers scarlet, shading to white center.

MADONNA. Flowers white.

MAGENTA RUBY. Flowers dark sparkling red wine. Free bloomer.

MARIA WILKES. Flowers dainty pink, white towards the center.

MAXIME KOVALEVSKI. Flowers orange shade of Lincoln red. Fine vigorous grower; handsome foliage; a great acquisition to the bedding class.

MISS BURDETT COUTTS. Flowers vermilion. The most beautiful of the tricolors. Leaves with cream edge and green center, purple zone splashed with pink.

MME. CHARLES POMARET. Flowers scarlet. Showy plant.

MME. FOURNIER. Flowers scarlet. Leaves dark green, zoned and scalloped. Dwarf.

MME. JAULIN. Flowers delicate peach-pink, shading to a daybreak-pink in the center. Semi-dwarf, compact, vigorous habit; broad, deep-zoned foliage.

MME. SALLEROI. No flowers. Dwarf habit. Leaves primrose-yellow, wide irregular border, inner leaf leek-green, dentate. Well-known edging plant.

MONTAGNE ROUGE. Flowers beautiful scarlet-red. Tall in habit with fairly dark leaves.

MRS. E. G. HILL. Flowers soft salmon, deeper center.

MRS. NELSON EDDY. Flowers very delicate pink.

NEW LIFE. Flowers scarlet flecked and striped with white. Occasional flowers may be all scarlet, or all white with a pink center, or part of a flower may be of one kind and part another. No two are alike. Very interesting old-time variety.

NEW PHLOX. Flowers white with vermilion eye in the center. Exceptionally long-lasting flowers.

NUIT POITEVINE. Flowers deep crimson, the upper petals a little redder.

OLYMPIC RED. Flowers excellent scarlet-red.

ORANGE RICARD. Flowers orange to orange-scarlet.

PAUL CRAMPEL. Flowers brilliant scarlet. Dwarf and robust constitution; large trusses and very floriferous.

PERSIAN ROSE. Flowers purple-rose with a slight amount of white in the center.

PIGMY. Flowers cherry-red. Pretty light green zoned leaves. Smallest of all the zonales.

PINK HAPPY THOUGHT. Flowers pink. Leaves ruffled with yellow center and white-green margins.

PINK PEARL. Flowers light pink or very pale rose, with some white in the center.

PINK POINSETTIA. Flowers soft delicate pink. Narrow rolled and twisted petals. Each flower resembles a miniature cactus-type dahlia.

PRINCE OF BISMARCK. Flowers light salmon. Fairly large, nicely lobed, yellow-green leaves with a bright rust-red zone.

QUEEN OF THE WEST. Flowers salmon-red with upper two petals paler and with whitish streak at the base of petals in the inner corolla. A vigorous and tall-growing variety with slightly zone-marked leaves.

RADIO RED. Flowers bright red.

RAMONA. Flowers vermilion, crimson and rose blend.

RED FIAT. Flowers clear red. Beautiful foliage.

RED LANDRY. Flowers scarlet with salmon tones. Useful for window boxes and bedding.

RYECROFT WHITE. Flowers white.

SCARLET PIMPERNEL. Flowers scarlet. Small dark leaves. Dwarf.

SILVER S. A. NUTT. Flowers crimson-scarlet. Exquisite foliage, having a green ground edged white.

SINGLE PINK BIRD'S EGG. Flowers rose with some white in the center. Petals spotted with rose-red dots.

SPRITE. Flowers salmon-coral. Small dark, grayish green leaves with a wide ivory-white border. Dwarf.

STARLIGHT. Flowers white.

TENNEY'S SCARLET. Flowers scarlet.

VESUVIUS. Flowers scarlet.

NEWS, NOTES and COMMENTS

Gold Medal to Henry F. du Pont. The coveted gold medal — it is seldom awarded — of the National Association of Gardeners was presented to Henry F. du Pont, member of the Board of Managers of The New York Botanical Garden, for his outstanding contributions to horticulture. The presentation took place at the du Pont Country Club during the annual convention of the National Association of Gardeners which was held in Wilmington, August 19-21.

A seedling of the oldest white oak in America was planted by the Association at the approach to the new Delaware River Memorial Bridge. The parent tree, "the Great White Oak of Wye," started its life about fifty years before Columbus made his first trip across the Atlantic four hundred sixty years ago. In splendid condition, it stands at Wye Mills on the eastern shore of Maryland and has been made the official tree for that State. The seedling was sprouted from an acorn the same year in which ground was broken for the stately Delaware River Memorial Bridge.

Educational Program at The New York Botanical Garden. The autumn 1952 term opens on September 11 with the class in "Flower Arrangement." Mrs. William Stickles, lecturer and accredited judge of the Federated Garden Clubs of New York State, will conduct four lessons in fundamentals of design, color and color combinations, texture and forms. Amateur and advanced amateur gardeners will gain practical down-to-earth information from the course in "Landscaping the Home Grounds." Arthur F. Murphy, landscape architect of the New York City Park Department, will teach students how to develop their own properties and make their own landscape designs. The first lesson in this course falls on September 24.

Six classes in "The Cultivation of Trees and Shrubs" will be held on alternate Thursday evenings, starting September 25, with Edmund Schubert as instructor. Mr. Schubert, a renowned plantsman, has been a member of the Park Department of the City of New York for the past fourteen years. The classes in "Cultivation of Trees and Shrubs" constitute the autumn 1952 term of the Two-Year Course in Practical Gardening offered by The New York Botanical Garden to meet the needs of amateur and professional gardeners, alike.

The first session in the Two-Year Science Course for Gardeners begins September 29 and continues for twelve consecutive Monday evenings, excluding February 22. Dr. H. W. Rickett, Bibliographer of The New York Botanical Garden, will conduct the class in "General Botany I" and Dr. John J. Wurdack, Assistant Curator, will teach "Ecology and Plant Geography."

Further details about these and other courses in horticulture, botany and nature study may be obtained from the "Educational Program," copy of which may be had on request. Address G. L. Wittrock, The New York Botanical Garden, Bronx Park, New York 58, N. Y.

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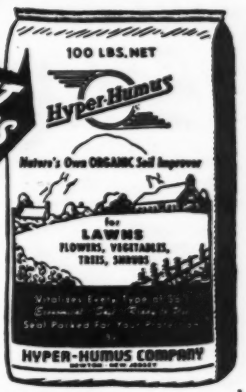

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Saturday Afternoon Programs. The first of the autumn 1952 Saturday Afternoon Lecture Programs will be an illustrated talk on October 4 on "Flower and Fruit Arrangements of Colonial Williamsburg" by Mrs. Louise Fisher, Flower Supervisor of Colonial Williamsburg. On the following Saturday afternoon, October 11, Mrs. Elizabeth S. Williams will give an illustrated lecture on "Trailing the Little Known." Mrs. Williams, who was on active military service with the American Red Cross from 1941 to 1946, has had intimate experiences, some humorous, others dramatic, with the lives and customs of people on the Pacific Islands.

This series, which runs through December 6, includes many interesting lectures and well-known lecturers. All the lectures are held in the lecture hall of the Museum Building and begin promptly at 3:30 p.m., and are open to the public without charge.

BOOK REVIEWS **(from page 160)**

THE ORIGIN, VARIATION, IMMUNITY AND BREEDING OF CULTIVATED PLANTS. N. I. Vavilov (Translated by K. Starr Chester). 364 pages, illustrated, indexed. Chronica Botanica, Waltham, Mass.; Stechert-Hafner, Inc., New York. 1951. $7.50.

Translated by K. Starr Chester, this book reveals Vavilov's great "contributions on the origin of cultivated plants, the law of homologous series in variation, the immunity of plants from diseases and the scientific basis of wheat breeding."

Born in Russia in 1887, Vavilov studied in England, traveled extensively, and contributed invaluably to the knowledge of genetics, plant breeding, plant variation and evolution.

FLOWER ARRANGEMENTS FOR ALL OCCASIONS. Marie Johnson Fort, edited by Robert L. Sommerville. 237 pages, illustrated. Rinehart, New York. 1952. $8.50.

Having looked too long and too closely to rules, readers will find this book refreshing. The theme is freedom in technique with emphasis on common sense. Clarifying her intent, Mrs. Fort defines factors guiding intelligent handling of flowers suited to home settings of "formal mansion, cottage, small home or apartment." Readers are compelled to remember that "flowers should be used to enhance the unity of a room." Though text gives direction to floral combinations for contemporary living, traditional background evaluates relation between flower groupings planned in the spirit of yesteryear and those of today. In sharing successful examples, Mrs. Fort contributes significantly to help in table and party designs. A chapter devoted to church arrangements represents aid in understanding properties of fitness and expression. Color discussion brings into focus quality of the author's thinking. A suggestive list of harmonies is appreciable. Text on mechanics, containers, and preservation of materials is in detail.

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in ninety-eight illustrations to both accent and supplement the text. Plates are tastefully chosen though readers, through comparison of those in color with those in halftone, may feel a quality let-down in the black and white reproductions. The more original feature of the book is suggested substitute materials for each arrangement pictured. This gives impact to Mrs. Fort's conviction that arrangers' work is application of principles, not rules. And it sharpens her appeal for flexibility in arrangement in that readers are prevented from forcing any arrangement into any one definite mold. All this is permanent basis for home arrangements.

EMMA H. CYPHERS
Clifton, N. J.

THE JOY OF FLOWER ARRANGING. Helen Van Pelt Wilson. 252 pages of text; 104 photographs. M. Barrows & Co., New York. 1951. $3.95.

THE JOY OF FLOWER ARRANGING carries an apt title. The book is easy to take. The persons who would benefit most from it are those who have training in elementary flower arrangement but who are not yet advanced arrangers — in other words, the intermediate group.

An introduction by Mrs. Wilson stresses the fact that these arrangements are for *home* use. The reader can sense this, because some of the examples do not adhere to the hard and fast rules usually observed in exhibitions. Over-abundance of material and weakness of design are evident in several of the illustrations. Interfering lines and lack of balance are noticeable in others; but for the decoration of our own homes these faults are overlooked.

The book is presented in twelve chapters, representing various parts of our country. An outstanding arranger from each of these twelve states has presented eight or nine arrangements or compositions. Introducing each chapter is a statement of her belief, with additional comments by Mrs. Wilson. Each photograph is accompanied by a brief text describing the material and mechanics used to create the arrangement. There is at least one outstanding arrangement and, in some instances, more than one in several of the chapters. It is heart-warming to see the emphasis upon improving church flower arrangements. The several creations which tell a story by the use of one or more figurines are thought-provoking.

ELIZABETH J. HUYLER
Gladstone, N. J.

from the HERB SHELF

FRIED TOMATOES WITH BASIL

3 firm tomatoes
½ tsp. salt
1 tsp. powdered dried sweet basil, *or*
Several finely chopped fresh basil leaves
1 tsp. sugar
3 tbs. flour
Bacon fat
1 cup cream
Salt and pepper

Slice tomatoes in ¾-inch slices. Mix sugar, salt, and sweet basil thoroughly with flour in a shallow dish. Dip tomatoes in the flour mixture. Fry quickly in hot bacon fat, browning both sides. Remove slices and keep hot on a warmed platter. Pour cream into frying pan and stir until very hot, but do not boil. Season lightly with salt and pepper, pour over tomatoes and serve sprinkled with finely chopped sweet basil and a dash of paprika.

These tomatoes may also be served on a slice of hot buttered toast with a thin slice of lightly fried ham under the tomato or a slice of bacon topping. This is a perfect luncheon dish.

ELIZABETH REMSEN VAN BRUNT

ZUCCHINI SQUASH IN BASIL VINEGAR

1 squash
Olive oil
Basil vinegar

Slice squash in ½-inch slices. Fry in olive oil until well browned on both sides. Pour basil vinegar over slices, cover pan, and place in moderate oven (350° temp.) until squash is tender.

MARY WHITMAN

The common or sweet basil *(Ocimum Basilicum)* originated in India, where it is regarded as a sacred plant. The name comes from a Greek word meaning king — "a herb fit for a king."

Basils are tender, so it is often best to start the plants indoors and then set them out 6 to 10 inches apart when the ground is warm. The herbage is cut while the plants are growing, and vigorous plants will produce a new crop if located in a good soil.

Basil has an aromatic scent and taste which makes it very useful in cooking. It may be added to many dishes and is particularly effective with tomato dishes and stews.

THE QUESTION BOX

Address your questions to *The Question Box, The Garden Journal of The New York Botanical Garden,* Bronx Park, New York 58, N. Y.

Q. *I seem to have borers in my cultivated blueberries. I first noticed borings at the base of the plants and a small hole in the stalk and finally they have circled the stalk, which fell over. Not all varieties were affected, at least as yet. If I could control the borers, I would like to replant the same area. I have read considerable in bulletins, but have found no mention of borers.*

A. The azalea-stem borer, *Oberea myops,* often girdles young blueberry stems during late June or early July, causing wilting and death of the branch tips. Cutting the wilted tips well below the girdled area and burning these during July usually suffices to keep this pest under control.

P. P. PIRONE

Q. *What is the neptune fern? It is said to be an air plant and has been used for years in table decoration. Does it need water?*

A. The neptune fern is not a plant but a marine animal. It consists of dried colonies of a *Sertularia,* a relative of the corals and sea-anemones, dyed green. People have reported that their specimens grew when watered, but this appears highly improbable.

DONALD P. ROGERS

Q. *I plan to plant a border, about one hundred fifty feet long, with shrubs or small trees to give privacy to my garden. The plants should grow eventually to a height of fifteen feet or more. The soil is clay and particularly in spring quite wet. What plants do you recommend?*

A. Small trees and shrubs that may be expected to thrive in rather heavy, wet soils include spice bush (*Benzoin aestivale*); button bush (*Cephalanthus occidentalis*); fringe tree (*Chionanthus virginica*); sweet pepperbush (*Clethra alnifolia*); winterberry (*Ilex verticillata*); privet (*Ligustrum vulgare*); elderberry (*Sambucus canadensis*); pussy willow (*Salix discolor*); and *Viburnum tomentosum.*

These, or a selection of the above, should make an appropriate border planting where plant material that eventually reaches fifteen feet high is required.

T. H. EVERETT

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